CEREAL SCIENCE today

35c PER COPY APRIL 1960 VOLUME 5 • NUMBER 4

UNIVERSITY OF BRITISH COLUMBIA
APR 6 1960
LIBRARY

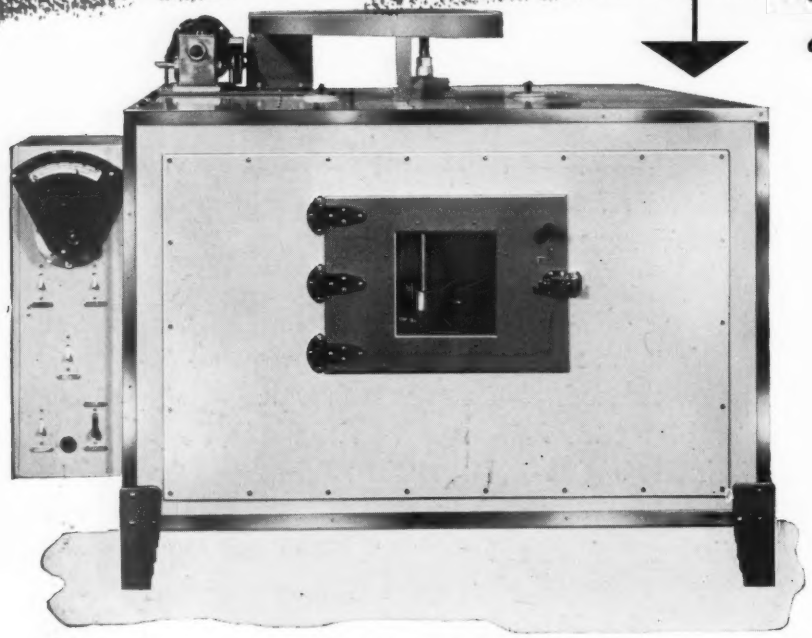
AN OFFICIAL PUBLICATION
OF THE
AMERICAN ASSOCIATION
OF CEREAL CHEMISTS

OF INTEREST THIS MONTH

SYMPOSIUM ON WHEAT BREEDING
QUALITY CONTROL — A COMMUNICATIONS PROBLEM
HIGHLIGHTS OF AACC ANNUAL MEETING

Rotary Hearth TEST BAKING OVEN

for test baking bread cakes rolls biscuits etc.



AVAILABLE

In 3 STANDARD SIZES

Electric and Gas Fired

26" dia. Rotary Hearth Oven
Floor space 46" wide x 36" Wt. 800 lbs.
Light Grey Enamel finish with stainless trim

PRICE $880.00
IN LUSTROUS FULL STAINLESS $1030.00

32" dia. Rotary Hearth Oven
Floor space 52" wide x 42" Wt. 900 lbs.
Light Grey Enamel finish with stainless trim

PRICE $980.00
IN LUSTROUS FULL STAINLESS $1180.00

38" dia. Rotary Hearth Oven
Floor space 58" wide x 48" Wt. 1000 lbs.
Light Grey Enamel finish with stainless trim

PRICE $1140.00
IN LUSTROUS FULL STAINLESS $1390.00

Available In Special Sizes and Types to Your Order at Extra Cost

We also Offer Heavy Welded Steel Oven Stands Finished in enamel with stainless trim to fit any oven we make

Price for 26" Oven — $100.00
Price for 32" Oven — $115.00
Price for 38" Oven — $130.00

The ovens listed above in our electric heated line are equipped with Bristol Model 280B Controller. Upon request we can substitute the Partlow Controller No. L2-6KLP-110 at the same price.

The Minneapolis-Honeywell's Brown Pyro-Vane Controller at $210.00 extra is offered to Laboratories that want the very best, not only in accuracy and tolerance, but in those instances where vibration is present to a degree that standard controllers have been known to have some difficulty from the chattering standpoint. The Brown Pyro-Vane Controller overcomes such difficulties and includes features of value enumerated in their brochure.

In our Gas Fired Ovens we have used Robertshaw Control, Model No. XR and Minneapolis-Honeywell Pilotstats. This combination has been very effective over the years and is standard with us at this time. There are but limited reasons for offering an alternate to the Robertshaw Control in the gas fired ovens, same being closer tolerances and longer life, together with features detailed in certain manufacturers literature, including Minneapolis-Honeywell. Our experience is quite limited on any given model and therefore, should there be a discriminating customer with a definite specification we will be happy to quote.

Prices are F.O.B. Lincoln.
Terms 1% 10, Net 30 Days

CEREAL CHEMISTS' EQUIPMENT MANUFACTURER

NATIONAL MFG. COMPANY
LINCOLN, NEBRASKA

Nutrition-Conscious Customers Buy Fortified Products

You gain an edge over competition, create excitement *and* sales by fortifying with Merck Vitamins and Amino Acids. Almost any processed food is a candidate for fortification, and you can choose from nearly a dozen Merck Nutrients—all easily adaptable to normal food processing operations.

You'll find unlimited possibilities for developing new products by adding extra nutrients—not just those for which the Government has set Minimum Daily Requirements (Vitamins A, D, B_1, B_2, Niacin), but other essential nutrients like Vitamin B_{12}, Lysine, and Vitamin B_6—each loaded with consumer glamour.

Merck can supply you with all these nutrients—and top-notch technical service to boot. Just call in your Merck representative or write directly to Rahway for the details.

MERCK CHEMICAL DIVISION
MERCK & CO., INC. • RAHWAY, NEW JERSEY

©Merck & Co., Inc.

Controlled FLEXIBILITY

FOR CUSTOM DESIGNED, SPECIALIZED SHORTENINGS

Flexibility in the manufacture of shortening? . . . Oh, yes, that's the ability to produce *any* type, *any* amount of special formula shortening—quickly, and precisely to specification.

Not only is this HumKo Products' ability, it's HumKo's *proven record* of performance. Further, it's good reason why HumKo Products is one of the nation's largest suppliers of a variety of shortening products.

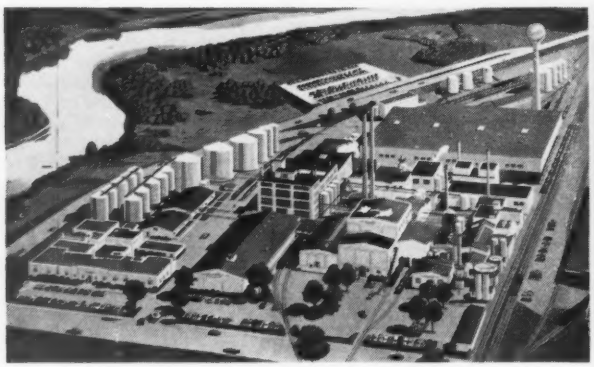
With unsurpassed manufacturing and research facilities—supervised by skilled shortening specialists—HumKo *makes more than a dozen different specialized shortenings every day.** HumKo also provides *helpful* technical service, quick delivery, and at lowest possible cost.

Find out how HumKo's "controlled flexibility" can become the answer to *your* specialized shortening problem.

**Such special formulas include: cracker, potato chip, and doughnut types, shortenings for the prepared mix industry, high emulsifying types of hydrogenated vegetable or meat fat shortenings for virtually every food use.*

HUMKO PRODUCTS

GENERAL OFFICES
MEMPHIS, TENNESSEE



General Offices and Main Plant—Memphis, Tennessee

Midwestern Plant—Champaign-Urbana, Illinois

VOLUME 5 • NUMBER 4 • APRIL 1960

CEREAL SCIENCE today

FEATURES

Management Looks at Quality Control — A Communications Problem. D. B. Pratt, Jr. 90
Problems in Wheat Breeding. E. G. Heyne 94
Entomological Problems in Developing New Wheats. Reginald H. Painter 98
Pathological Problems in Developing New Wheat Varieties. C. O. Johnston 100
Testing for Milling and Baking Quality of New Wheats. John A. Shellenberger 104
The Farinograph Mixing Bowl 106
AACC 45th Annual Meeting Highlights 108
Official Reports of the AACC for 1959 110

DEPARTMENTS

Editorial 89
AACC Local Sections 116
Feed Technology 118
People, Products, Patter 120

STAFF

PAUL E. RAMSTAD, EDITOR

R. J. TARLETON, Managing Editor
C. H. BAILEY, Consulting Editor
EUNICE R. BROWN, Assistant Editor
DOREEN RENTZ, Circulation Manager

DEPARTMENT EDITORS
Baking Technology:
Oscar Skovholt,
Cecil F. Pinney
Feed Technology:
Robert C. Wornick
Flour Milling:
H. H. Schopmeyer
Laboratory Helps & Gadgets
Donald C. Meek
Nutrition:
W. B. Bradley
Sanitation:
Kenton L. Harris
Starch and Starch Products:
Frank E. Horan, Thos. J. Schoch
Washington Highlights:
Frank L. Gunderson

CORRESPONDING EDITORS
AUSTRALIA: R. A. Bottomley
CANADA: T. R. Aitken
DENMARK: Holger Jorgensen
ENGLAND: J. B. M. Coppock, C. R. Jones
FRANCE: Jean Buré
GERMANY: Paul Pelshenke
HOLLAND: G. L. Bertram
ITALY: Ottavio Chiriotti
JAPAN: Mitsuo Uemura
NORWAY: Halvor Norheim
PERU: Miguel Rasic
SPAIN: A. Quintana Mari
SWEDEN: Sven Hagberg

COVER: Skyline view of Chicago. Photo from Chicago Convention Bureau.

Copyright © 1960 by the American Association of Cereal Chemists, Inc.

CEREAL SCIENCE Today is published ten times per year (monthly except June and August) by the American Association of Cereal Chemists, from 500 South 5th Street, Minneapolis 15, Minnesota. Editorial, Circulation and Advertising Headquarters: 1955 University Avenue, St. Paul 4, Minnesota. Entered as second class matter at the post office at Minneapolis, Minn., under the Act of August 24, 1912.

The American Association of Cereal Chemists assumes no responsibility for the statements and opinions advanced by contributors to its publications. Views expressed in the editorials are those of the editors and do not necessarily represent the official position of the American Association of Cereal Chemists.

Subscription rates: 1 year, $3.00; 2 years, $5.00; 3 years, $7.00. Foreign postage: $1.00 per year extra. Back issues available on request. Single copies: 35 cents.

CHANGE OF ADDRESS: Notify Circulation Department, American Association of Cereal Chemists, 1955 University Avenue, St. Paul 4, Minn. Include both old and new addresses and postal zone number, if any. Claims for missing numbers will not be allowed if received more than 60 days from date of mailing plus time normally required for postal delivery of journal and claim. No claims allowed when subscriber has failed to notify the Circulation Department of a change of address, or because copy is "missing from files."

GUS IS A CHIN RUBBER...

When this trio puts its heads together, physical testing generally is due for an improvement. Dedicated as they are to the perfection of instruments for the cereal industry, it is natural that these men share their skills with one another.

The chin-rubbing Gus Schmitz, for example, intimately knows every Brabender instrument in use in this country. His proficient "finger-prints" are on more than 90% of them. And, Walter Blake, in the middle, delights in keeping tabs on everything that goes on in the manufacturing and development departments. As former head of research and development for one of the largest flour milling companies, he knows what the industry wants, and helps to see that they get it.

The name of the third gentleman, C. W. Brabender, on a physical testing instrument means perfection. It is C.W.'s conviction that in addition to modern, dependable instruments, you deserve ironclad warranties of performance and technical sales service. You get it from his company . . . the creativity, the quality and the application advice . . . the kind of heads-together help that has made C.W.B. the leader. Come in and meet Gus and C.W. at the A.A.C.C. in Chicago, May 1 to 5.

C. W. Brabender Instruments are first choice of the cereal industry, because:

1. They are built by engineers who know the cereal industry.
2. They are engineered for economy, accuracy and reliability.
3. With each instrument goes the offer to help you — in your lab or ours.
4. They are unconditionally guaranteed!

Any time you're in our neighborhood, come in and visit us. We'll be proud to have you look through our manufacturing plant and service laboratories. We are only 30 minutes from Times Square.

C.W. Brabender

Instruments, Inc., SOUTH HACKENSACK, N. J.

50 EAST WESLEY STREET **DIAMOND 3-8425**

Editorial

With the approach of our 45th annual meeting in Chicago, the American Association of Cereal Chemists stands on the threshold of many new advances in fundamental knowledge of the materials with which its members work. This will be reported in the many fine technical papers which will be presented at Chicago. More important, however, is the fact that the basic research reported at past meetings and in our publications has sparked the most active period in our history as a technical society of practical application of this knowledge.

During the past few years new methods of flour milling have been introduced — air classification, new grinding techniques, electrostatic separation, and many other new processes which are now in the advanced development stage. We can proudly say that our membership has contributed in major proportions to these innovations. We have reached the "pay-off" stage in our history as a technical society. New advances have been achieved in other areas of cereal processing — in the wet-milling industry, in the area of prepared or convenience foods, and in animal feeds. Most important is the fact that all of these advances have meant more efficient utilization of the abundance which God has seen fit to provide for us in our vast cereal crops.

The "pay-off" is small, as of the moment, when we consider the vastness of human needs — better health through better nutrition, and freedom from want coupled with economic growth in the underdeveloped, high-population areas. As the "pay-off" grows in magnitude by further application of that knowledge we acquire through free communication within our organization, we can be justly proud of our Association and its contributions to humanity. Truly we can cite ourselves as "those few to whom so many will owe so much" — a group of just fourteen hundred highly specialized people contributing in a major way to the very lives of the two and three quarter billion inhabitants of this earth. This is our challenge!

D. B. Pratt, Jr.

President, A.A.C.C.

A MESSAGE FROM THE AACC'S PRESIDENT

Management Looks at Quality Control — A Communications Problem[1]

By D. B. Pratt, Jr., Quality Control Department,
The Pillsbury Co., Minneapolis, Minn.

IN THE SEPTEMBER 1958 issue of CEREAL SCIENCE TODAY, your immediate past president, Clinton L. Brooke, discussed the role of the AACC in the cereal industry. He pointed out in rather broad terms the means by which our organization of professional people services the cereal industry: through exchange of ideas at annual meetings; through publication of technical research work, both pure and applied; and through the work of technical committees within the organization which serve as development groups for analytical procedures, establishing accuracy and common grounds for work effort between various types of laboratories and laboratory staffs. In his visits to the various Sections Mr. Brooke elaborated on the article mentioned above, pointing out those challenges which management has posed to our organization in terms of basic research needs, greater fundamental knowledge of our products and the raw materials with which we work, and what we might do about these challenges in a realistic approach.

My title, though somewhat diverse from Mr. Brooke's presentations, follows much the same line of thought but from a slightly different aspect. Selling quality control is a matter of communications, and until these communication lines are firmly established the economic stature of the cereal chemist is most difficult to appraise or improve. I think this is true of all industries, whether it be rubber, or textiles, or steel, or other food areas.

Each year the American Chemical Society expends a great deal of time and money in surveying the economic status of chemists at various degree levels and with various work experience beyond their collegiate training. When one looks at the average pay rates of these people, it is shocking to see how few highly technically trained individuals achieve the annual salary level of $8,000 to $10,000. Shocking, yes, when one considers that the high-salaried salesman would have nothing to sell were it not for production and the quality control team. But sales people have sold their worth to management.

Many of us have said at one time or another, "God bless the sales department — you can't live with them, but you sure can't live without them!" By the same token, I have heard salesmen for reputable companies admit that they did not know their manager of quality control, and refer in a disparaging way to the "long-haired brain-trusters locked in their ivory towers with a bunch of test tubes and bottles, who can't appreciate what we salesmen go through to sell their product." Doesn't this type of remark by a salesman point up a lack of communications between sales and quality control or the people in the laboratory?

The Production Side

Production managers command substantially higher salaries than do quality-control people; yet how well can a production manager manage without tools? The laboratory and the personnel of that laboratory are just as much an integral part of the production operation as the machinery itself. The machinery would be of little value if its productivity could not be identified, or changed at will to meet a specification, with the positive knowledge that the changes were effective. This knowledge must come from the laboratory and Quality Control. Here again, shall we call it communications, or is it establishment of a rapport between high-level technical people, on the one hand the engineer in charge of production, and on the other the graduate chemist in charge of quality control of the incoming raw material and finished product.

The Merchandising Side

In still another area of comparison, let's look at merchandising people — not the salesmen — but those who think up the ideas for package inserts — Lone Ranger rings and Audubon bird cut-outs — or fancy dog-whistles you can get for a quarter and a can top, or puzzles to solve for a trip to Bermuda or around the world. People get paid for doing these things, and paid well; yet dog-whistles, Lone Ranger rings, Audubon birds or trips around the world won't sustain an inferior product in the market for very long. The quality of that product must be controlled, at a satisfactory quality level. Yet how many quality-control people know these merchandising people even within their own organization? Or, knowing them, do they communicate to them those factors of quality which make their product outstanding? Do they call on the merchandising people for ideas that might be utilized in improving a product? This is another area of communications.

The Customer

Communication with customers is probably one of the weakest links in the communication network between quality control of a supplier and the ultimate users of his product. Too of-

[1] This is an address which the author, as National AACC President, has given before the various Local Sections during recent months.

ten the salesman, failing to recognize or to communicate with quality-control or technical people at headquarters, relies on his price list alone. The customer wants something for $5, so the salesman gets his book out to see what he has for $5, and says "This is it — it will do the job." Or if he does remember Quality Control, perhaps he obtains a sample of the product the customer is using and submits it to the laboratory for analysis and match. If the match comes back recommending a $5 product, but $5 won't get the business, the salesman sells a $4.95 product and hopes this works.

Here the salesman has failed to recognize a need for communication and to call on his quality control department for it. When he obtained the sample, did he ask the customer whether this product was performing satisfactorily, or did it represent some compromise? Could the product be better for the use to which it was being put? In the case of flour, was the baker making a good loaf of bread with that product, or was it only a mediocre one, and if so, why was it mediocre? The flour could be too strong for the mixing capacity of the plant, or it could be too weak to withstand the shop conditions to which it was exposed. These factors, if properly communicated, could result in a far happier customer and a much firmer relationship between customer, sales, and Quality Control.

Only recently a very good bakery account was producing excellent bread from a particular type of flour and had been a steady customer over a number of years. Unknown to the salesman, or if he did know he didn't communicate it to his headquarters or to quality control, was the fact that the baker was very quietly, on a terrific hush-hush basis, installing a continuous breadmaking system. The system was completed and placed in operation with the same flour product — with disastrous results. What had been an excellent flour, overnight became sawdust, not fit for birds. "Take it back or else," the baker threatened. When proper communication was finally established, two very minor changes in treatment of the flour were made; nothing else. The product performed beautifully. Had the salesman or the customer properly communicated the proposed changes, much ill-will could have been avoided. Yet the salesman was not entirely to blame in this situation, for had the quality control man had a line of communication direct to the customer, corrections could have been made well in advance of any possible difficulty.

How many of us, as technical people, have taken the time to discuss with our customers, upon whom we depend for our living, what they want, how they want it, or how it might be improved or changed to better suit their needs? Would we try to sell iceboxes to the Eskimos?

Our Responsibility

We as chemists and as quality control people and workers in research, both pure and applied, are guilty in various degrees of failure to communicate. It is through the establishment of such communications as have been cited here that chemists and quality control people generally can improve their stature as well as their economic well-being within the structure of a business. Only through good communications can management be made aware of the value of its quality control people in terms of their relationship to the long-range good of the business. In too many instances Quality Control has been looked upon by Production, by Sales, and even by Management as a necessary evil — a group to be tolerated, not encouraged or even permitted to grow. Businesses and plants where this situation has existed have themselves stagnated until management finally consented to recognize the importance of quality and of the people charged with maintaining that quality. In many instances this "consent to recognize" did not come about through communication from the quality control department; more likely it came from stockholders and a board of directors who called in outside consultants to evaluate the management team, or perhaps to evaluate the entire business from the standpoint of its failure to prosper in a consumer marketing area.

Let's sell Quality Control and let's sell Management on our value. How can we do this? Through communications: not just to the boss, but to all areas, such as sales, merchandising, production, top management teams, by actually becoming a part of each of these groups and winning their respect for our knowledge and our ability to make their jobs easier. They can gain confidence in us only if we communicate with them, and through these communications contribute the results of our technical training and our technical efforts, to be utilized in all aspects of the business operation.

As an organization, the AACC brings together research people, academic people, quality control people, development people, and technical sales people, and here communications are excellent. This is why all of us benefit through attendance at our sectional meetings and at our national meetings. We also receive and read our technical journals. Here there's no room for criticism so far as communications are concerned; but while selling ourselves to each other, if you will, we have not always sold ourselves to those people responsible for our economic stature.

The Quality Control Manager

Now let's look at what Management expects of a quality control manager. As we go through this job profile, think about each accountability in your job, how well are you doing it, and most important of all, how well are you communicating the fact that you are doing it? Management may not even be aware that you are performing a function, and it's just plain taken for granted that you do this. If you are not doing a particular chore that logically falls in the area of quality control by a qualified technical man, why not broaden the scope of your position and undertake to do it?

First of all, the manager of a quality control department must be accountable directly to his plant manager on all matters concerning the administration and operation of his laboratory in accordance with the established quality standards and policies set down by management, or, in the case of multiple operations, by top management. This is a broad statement and quite general as to just where quality control fits in in the organization. Under this general administrative positioning, he then must establish and carry out a program in such a way as to ensure that finished products leaving his plant meet established quality standards and conform in every respect to such regulations of the federal, state, and local governments as might apply to his products.

The quality control manager establishes, as needed, a program for quality checks during the manufacturing process which, when properly applied,

will assure products of consistently and uniformly high quality. He also might be called upon to make sure that package materials conform to specifications and that finished packages are uniform, neat, and sanitary.

A very important and often overlooked aspect of quality control is the performance of quality checks and inspections on incoming raw materials to ensure their compliance, not only with established specifications, but with legal requirements.

Personnel Considerations

In the area of personnel, the quality control manager *must* make his management aware of the necessary qualifications for professional and technical personnel, so that the level of ability in his staff shall be adequate to discharge its function for his plant. He must be sure himself that personnel recruited for each technical position have the required qualifications and adequate training for effective execution of their function.

Here's another area that is often overlooked. The quality control manager develops and trains professional and technical personnel to satisfy future divisional and/or corporate needs. Technically skilled people are trained in such a way that they may be utilized in the sales effort, consulting with customers on their needs, and representing the company at a technical level. Some organizations even insist that new sales people, new purchasing people, and other employees in areas where some technical understanding might be advantageous, spend a certain amount of indoctrination time in the quality control area — not learning to become chemists, but learning to appreciate the technical implications of their new association.

The head of the quality control department must communicate to his management and develop with it the program for salary administration in his area, to ensure that the necessary level of personnel qualified to carry out the functions of his department are procured and retained.

Where established programs or policies for quality control functions are considered inadequate, he must make this known to his immediate superiors, recommending the amount, type of facilities, and personnel needed at his location to ensure adequate tools and manpower for the efficient conduct of quality control activities. He must be satisfied that the quality control skills under his direction are utilized efficiently.

Keeping Wheels Oiled

Now we come to those areas where communication functions.

First, the quality control manager must be certain that management receives his recommendations and methods for solving quality problems and producing uniformly high quality products, and for improving the effectiveness of his program.

He must supply his plant manager, his production department, and his sales department with all necessary information and his recommendations for correcting specific situations which do or will jeopardize the quality of products produced at his locations.

At the direction of and in cooperation with heads of other departments within his company — that is, production, sales, and the like — he must on occasion supply to these areas such technical services as may be necessary in developing new accounts, as well as new products for specific end uses or applications.

He should provide, through his department and his efforts, adequate and sufficient service to raw material procurement at his plant. To make certain that supplies of desirable raw materials are adequate at all times to ensure uniform quality of finished products, he should supply materials procurement and production people with the necessary technical guidance. He should also advise and assist them in the proper handling, blending, and manufacturing practices which will most efficiently and economically utilize available raw materials and, at the same time, ensure that such standards as have been established for quality and uniformity of finished products are met.

He should be certain that he has communicated the *importance* of quality, both raw material and finished product, to all plant personnel and departments. He must be sure that those interpretations which his department places on the work performed by his group are understood and recognized by other departments.

Finally, he must be certain that he understands and places the proper interpretation upon those specifications or product definitions supplied to him, either by his management or by his customers' technical people; also being certain that this interpretation is properly communicated and understood by all plant personnel as well as those technical personnel under his direct supervision.

There are other, less specific, areas where quality control must function. The manager is of course responsible for all equipment and facilities supplied to him for the performance of his function. He should carry out an effective safety program within the plant and within his own laboratory against all types of industrial accidents and should undertake periodic inspections of the plant from the standpoint of sanitation.

Summing Up

I have tried to set down what management looks for from quality control. Each of us, I am sure, could elaborate greatly on each particular function if we stop to think just how we are performing it and how its scope might be enlarged. If we are to grow within our own organizations we must broaden the scope of our position and make management aware of the importance of our work and how we are performing the duties assigned to us.

It is easy to see how communications fit into this whole pattern. We can better ourselves substantially by learning to communicate, both in written reports and in verbal presentations to management. This problem of communications is not a one-sided affair. We must expect communications *from* those people to whom we are answerable. Yet these communications will only develop through our efforts, as quality control people, to communicate our thinking in such a way that management becomes conscious of and confident in our functional ability. When this confidence has been established, their communications to us will improve, and through this we can hope for more recognition within the corporate structure and within industry.

This is a challenge to all cereal chemists. We may have been guilty at one time or another of stagnation or of complacency within our job. Neither of these two attitudes contributes to our well-being as a professional group. There is no room in the fast-moving business world today for complacency. We cannot sit back and wait for management to come to us, and hope that this attitude will

(Please turn to page 99)

Safe food emulsifier

Safe food emulsifier

Use these emulsifiers with never a qualm about the recent Food Additives Amendment. *Myverol®* *Distilled Monoglycerides* are prepared from the glycerolysis of edible fats or oils. They give you exceedingly fine control over the texture of foods which contain fats. They are bland, stable. High in monoester content, they emulsify at lowest possible cost. To review what they can do for you, write ***Distillation Products Industries,*** Rochester 3, N. Y. Sales offices: New York and Chicago • W. M. Gillies, Inc., West Coast • Charles Albert Smith Limited, Montreal and Toronto.

distillers of monoglycerides made from natural fats and oils

DPi

Also . . . vitamin A in bulk for foods and pharmaceuticals

Distillation Products Industries *is a division of* **Eastman Kodak Company**

RELATED SCIENCES ARE COMBINED TO HELP SOLVE

Problems in Wheat Breeding[1]

By E. G. Heyne, Agronomist, Kansas State University, Manhattan

WHEAT IS STILL the chief food of man, although consumption per capita in some countries has declined. The production of wheat has increased faster than its use, even though there has been a rapid population growth. What has accounted for this continued increase in wheat production? A number of better farming practices and techniques, including more efficient machinery for seedbed preparation, planting, and harvesting, which, in turn, has made it possible for better timing of operations. Conservation of moisture in the soil and better control of soil erosion by wind or water also have aided in higher wheat production. The increased use of fertilizer where needed has given further increases in production. The job of the plant breeder is to increase production and quality by changing the genetic makeup of the plant.

A number of characteristics must be considered in the breeding of better wheat varieties. These problems extend into a number of biological fields and require the cooperation of specialists trained in various fields of biology and related subjects. The plant breeder is an individual trained in genetics, who applies the principles of inheritance to breeding problems. Other fields of study that support genetics are taxonomy, or plant classification; plant physiology, which relates to many phases of growth and development; biochemistry, which is closely allied to physiology and also to the quality of the grain; cytology and morphology, which are related to cells, tissues, and structures, and which have enabled plant workers to cross species and literally create new ones; statistics, which aid interpretation of data; and principles of crop production, including soil management. Much progress in breeding better wheat varieties has been made in the development of plants that resist diseases. Thus, the field of plant pathology, or the study of plant diseases, is of foremost importance. Likewise, an understanding of the relationships of insects to their host plants is an important phase of wheat breeding. Quality of the grain is given first consideration by those who use the product of the wheat plant. Because of the great importance of these last three subjects or problems concerning wheat variety development, they are discussed separately in this symposium. There will be some repetition, but at Kansas State University and in most other organizations, people work together on the problems related to wheat breeding to the extent that all the co-operators have a general understanding of the broad problems related to wheat breeding.

The order in which the problems are to be discussed is not related to the importance of each characteristic under consideration. In some areas one character may be of more importance than another; for example, winter hardiness is more important in Nebraska than in Kansas, and more important in Kansas than in Oklahoma.

Some of the major wheat-breeding problems in the Great Plains are: maturity, straw strength, shattering, hardiness, appearance, disease and insect resistance, yield, new germplasm, and quality.

Breeding for Early Maturity

Maturity of the crop has been of considerable importance in the breeding of both spring and winter wheats. Earlier varieties have extended the spring wheat area farther north and also have reduced the hazard of damage from early fall frosts, as well as harvest problems that occur in late summer and early fall. Earliness has aided winter wheat production by wheat's escaping drought conditions, especially in the southern Great Plains, and in some instances has aided in the establishment of grasses and legumes planted in wheat, or has made it possible to grow another crop after wheat where moisture supplies are adequate.

How far can we go in developing still earlier wheats? As we learn more about plant growth and development, we may be able to breed earlier wheats. However, at present, evidence indicates that the earlier a variety of wheat is, the less time it has to develop tillers or stems that bear heads, additional kernels in the head, or larger kernels. These three factors are directly related to yield, and a reduction in one or more of them reduces yield. However, in wheat production a potential reduction in yield due to earliness can be balanced by reducing harvest risks. While earlier spring wheats tend to escape damage to the grain from late summer frosts, earlier winter wheats become subject to damage by late spring frosts. If temperatures reach only two or three degrees below freezing while winter wheat is blooming, no seed will develop in the head. Thus, the advantages and disadvantages of early-maturing wheats must be balanced with the conditions under which the variety is grown. Maximum yields generally are obtained from later

[1] Contribution No. 673, Department of Agronomy, Kansas Agricultural Experiment Station, Manhattan. Part of a symposium on wheat breeding problems given at the AACC Tri-Section program at Manhattan, Oct. 10, 1959.

varieties where the environment is such that earliness is not important. In northern Europe and in England the wheat is "on the ground" as long as 11 months, and yields average as much as 70 bushels per acre in some areas.

In breeding earlier winter wheats, another problem occurs; the earlier a variety is, the less winter-hardy it tends to be. Thus, these two factors need to be balanced. This is a problem that involves plant physiology, and it is a subject on which more basic information may enable us to breed earlier winter wheats that are hardy. It may be that, by obtaining plants that are more efficient metabolic machines, this can be accomplished. We are all aware that in animals, and even in humans, some are better "feeders" than others, i.e., make more gain per pound of feed or food ingested. This is true also of plants, since metabolic procedures are basically alike in plants and animals. Therefore, the effects of these environmental factors upon the plant need to be studied separately in relation to a specific trait in the plant. For example, temperature and/or light may affect maturity in a different manner from the way it affects straw strength, or available moisture may have little effect on one plant character and affect another character to a great extent.

Straw Strength

The farmer is particularly concerned about harvesting his crop. This is generally the highlight of his crop-farming operations. It is essential that his wheat crop stands until harvest. Farmers in the Great Plains need a wheat variety with a straw that is different from that needed in the eastern United States, or areas where there is less wind. A stiff, rigid straw generally breaks in the winds of the Plains; hence a straw that will bend with the wind and spring back slowly appears to be more desirable.

The wind also causes shattering or threshing of the wheat while it is standing in the field. There are no wheat plants that are so stiff they will not bend. Those varieties that have a very stiff straw often have heads that are erect at maturity. Plants with stiff, erect straw, when moved by the wind, tend to snap back and strike each other, actually flailing out the grain. On the other hand, in a variety that has a resilient straw and a head that nods or leans over, the heads tend to move in unison, with less beating action. There are other factors related to shattering. Varieties with large kernels that are not covered by the chaff shatter more easily; inherent differences in the attachment of the chaff to the head, and differences in mineral depositions in various parts of the head all affect shattering. Even though a variety has high potential yield, it is necessary that the crop stand and remain in the head till harvest in order to obtain this potential. The improvement and advancement of harvest machinery, especially the change from binder harvest to combine harvest, made the problem of breeding wheat with standing ability and a nonshattering habit an important one.

Another way to increase the ability of straw to stand is merely to reduce its height. Lodging resistance by reduction in height can then be considered a problem in physics involving distances and force. Most of you have heard, read about, and perhaps seen the dwarf or semidwarf wheats. You are also familiar with the "combine" sorghums that made possible mechanized production of grain sorghums. In both wheat and sorghum, shorter plants are obtained by reducing a portion of the stem called the internode, i.e., the area between the nodes or enlargements on the stem. This shortening of the internode reduces the height without reducing the number of leaves. The leaves are the primary manufacturing sites of the wheat plant. As there is no reduction in the number of leaves, there is about the same area for photosynthesis in the dwarf varieties as there is in the taller types. This height reduction is controlled by only a few genetic factors, so this character can be bred into locally adapted wheats fairly easily. Dwarf wheats may be available in limited quantities for commercial production in the Pacific Northwest by 1963. Progress with hard wheats is not so far advanced, primarily because the quality of the dwarf parental material was not satisfactory for the hard wheats of the Great Plains area. Further crosses back to good hard red winter quality wheats are under way.

Hardiness

In the Great Plains we are constantly aware of the changing and unpredictable climate involving heat, cold, and drought. Wheat is a plant naturally adapted to growing under rather severe environmental conditions, and throughout its natural evolution it has acquired inherent factors for growth under such conditions. Therefore, progress in breeding wheats that resist cold, drought, and heat has been slow. In addition to what has evolved naturally, our knowledge concerning the physiological problems related to drought, cold, and heat response of the wheat plant is still primarily in the empirical stage. We know that temperatures over 90°F. and relative humidity under 20% will damage the wheat protein during the later period of ripening, and that some varieties can withstand these extremes better than others. The fact that varieties differ indicates we can make progress toward breeding wheats that resist high temperature effects. Nevertheless, if we knew more about *why* varieties differ, we could breed more intelligently for such characters. Further progress in these hardiness problems requires more basic information in the field of plant physiology.

However, advances have been made in developing winter wheats adapted farther north, to the extent that considerable spring wheat acreage has been replaced by winter wheat. In Nebraska little or no spring wheat was grown in 1959, while ten years ago there was a considerable acreage of spring wheat. Winter wheat is becoming more popular in South Dakota, and a significant shift to winter wheat has already been made in Montana. Wherever a winter cereal can be grown without winterkilling, it generally produces more grain than its spring counterpart. Therefore, breeding for winter hardiness has become a major objective in some areas. Satisfactory methods to evaluate cold tolerance can be conducted in the laboratory, but winter killing is due to more than just cold temperatures. The date of planting, soil compaction, fertility, amount of moisture, time of first severe cold in fall or spring, length of the cold period, and snow cover all contribute to the problem of winter survival. Although we do not need a particularly cold-hardy winter wheat for Kansas,

we need one that resists sudden cold periods in November or March and a variety that can withstand moderately cold temperatures when the soil is dry and when there is no snow cover. Therefore, winter-survival studies in Kansas under natural conditions are difficult to evaluate and nearly impossible to duplicate in the laboratory with our present knowledge and equipment. In Kansas our breeding material is not subjected to a season that eliminates nonhardy plants or lines more than once in every 5 to 6 years. This results in new strains which do not have the hardiness desired for our conditions. This illustration is given to emphasize the fact that there are still numerous biological problems related to breeding better wheats that are still unsolved.

Appearance

All of us take pride in the work we do or the object we make or produce; the farmer is no exception. He likes to see a large, plump berry of grain that has a bright appearance and, as measured by the trade, a high test weight. Although a test weight over 58 pounds or a bright, bleach-resistant grain does not add to the value of the processed flour, it certainly adds to the appearance of a wheat kernel. It has been said that some farmers will take a lower yield in return for appearance. We do pay some attention to these aesthetic features of the wheat berry and plant colors, but not at the expense of practical characters.

Attention is given to kernel texture and hardness as these are related to both milling and baking traits. In developing hard red winter wheats, we avoid those lines that are too hard or too soft. We attempt to keep them within a rather narrow range so they will all temper and mill similarly. Color of the kernel is not related to quality, except that production of certain colors has been restricted to various areas. A hard white winter wheat could be selected for the Great Plains area that would equal Ponca, Bison, or Nebred in quality characteristics. However, there is no justification, other than appearance, for developing a hard white winter wheat for this area. On the other hand, the introduction of a hard white winter wheat into the hard red winter wheat area would only add confusion to our marketing and grading problems.

Disease and Insect Resisance

Breeding for disease resistance has given the most spectacular results in plant breeding. Striking examples in several crops can illustrate these achievements in developing disease-resistant crops. Cabbage resistant to cabbage yellows makes it possible to grow this crop where it would be impossible without resistance. Flax could not be grown in Minnesota, North Dakota, and South Dakota except for varieties resistant to flax wilt, nor would there be a sugar industry in Louisiana if disease-resistant varieties of sugarcane were not available. Neither would there be so much wheat grown in the Pacific Northwest if there were no varieties resistant to bunt or stinking smut. There are many problems involved in breeding disease-resistant plants, as we are concerned with two living organisms. The disease problems of wheat are such a large and important phase of our wheat-breeding programs that Mr. Johnston will discuss them as another part of this symposium.

Breeding wheats resistant to insect attack is also a subject in itself, and it will be discussed by R. H. Painter.

Yield

Plant breeders, working in cooperation with other biologists, have had reasonable success in solving some of these problems. This has been readily demonstrated by the increased production of wheat per acre. Some of this increase has been accomplished without actually raising the yield potential of the wheat varieties. For example, we could develop a line of Pawnee wheat that would shatter less, and resist bunt, stem rust, and greenbugs. None of these problems may arise in a given year, and then the Pawnee with these added features would not yield more, neither would it yield less. Let us assume that stem rust occurred in damaging amounts during a certain year, then the Pawnee with the added protection of stem rust resistance would yield more than the original Pawnee. In one sense, the yield has been increased because of this "bred-in" protection, but actually the yield would be only maintained. In an occasional year, Turkey wheat has yielded the same as Pawnee at Manhattan, Kansas, between 1936 and 1959, but on the average Turkey has yielded about 75% as much grain as Pawnee during this period. We know that Pawnee has several "built-in" protection devices such as stronger straw, earlier maturity, and some disease and insect resistance. Such characteristics are responsible for its high yield potential.

It was mentioned earlier that yield in wheat, as measured by pounds of grain produced, is made up of the number of heads per unit area of land, the number of kernels per head, and the size of the kernels. If we can increase any one of these three characteristics without loss in the other two, we get an increase in yield. This becomes a very difficult problem. For example, when the number of heads is increased, the size of the kernels and the number of kernels per head tend to decrease. When kernel size is increased, the number of kernels per head often decreases. The relationship of these three components to each other can be illustrated by describing Pawnee and Wichita in these terms. Both of these varieties have high potential yield. When the number of heads of Pawnee and Wichita are counted in the same length of drill row, there are about 70% as many heads of Wichita as there are of Pawnee. However, the average weight of the grain per head from Wichita will be greater; but the number of kernels per head is nearly the same for both varieties. The average weight of single grains of Wichita is greater. When all three components are considered together, the yield by weight of the two varieties is nearly the same.

New Germplasm

Agricultural research has made tremendous advances in the application of science to farm production. However, one cannot rest on present achievements. The goal a plant breeder sets up generally is not reached for 12 to 15 years. The problem of keeping ahead of nature, where new forms of diseases are constantly occurring, requires a search for new germplasm. That is, we need new sources of resistance to many diseases and insects. They come from many strange places, such as wild grasses which are only distantly related to wheat. It takes many years to establish this resistance in an adapted wheat variety. Although there is a surplus of hard winter wheat, slowing down or stopping such work could easily lead to catastrophe. For example, if only

(Please turn to page 107)

*As fresh as Givaudan's new flavor**

*IMITATION PINEAPPLE FLAVOR F-1213!

We suggest, in all due modesty, that you will be surprised at the fidelity with which fresh natural pineapple matches the flavor of this new Givaudan creation.

We feel justified in making this turnabout comparison because the flavor of Imitation Pineapple Flavor F-1213 and that of the fresh fruit are virtually identical.

There are many pineapple flavors that resemble the canned type, but this new Givaudan product has the true sweetness, freshness and bouquet of the natural pineapple itself.

Imitation Pineapple Flavor F-1213 is the result of long and persevering efforts on the part of our flavor chemists—a creation which we are proud to add to our widely known line. Its concentration and stability make it ideal for those products in which a fresh pineapple flavor is desired at a minimum cost. Its powdered counterpart, *Permaseal® Imitation Pineaple Flavor F-2749*, is also a faithful reproduction of the fresh fruit flavor May we send you samples and further information?

Givaudan Flavors Inc.

321 West 44th Street, New York 36, N. Y.

TWO INSECTS THAT CONTRIBUTE HEAVILY TO

Entomological Problems in Developing New Wheats[1]

By Reginald H. Painter, Department of Entomology, Kansas State University, Manhattan

DEMAND FOR NEW crop varieties is usually dictated by the desire to reduce such production hazards as weather, plant diseases, and insects. Diseases and insects differ from season to season and from farm to farm, so much that any new variety must resist as many of them as possible. The two major insect pests in the hard red winter wheat area have been hessian fly and greenbug, which rank just below weather as a limiting factor in growing wheat. They are discussed in detail here to illustrate how important it is to cereal chemists and the milling industry to have them controlled. Also discussed is how wheats resistant to insects are being developed. Insects and plant diseases often supplement each other to compound weather damage.

Plants that are inherently damaged less or infested less by insects than others, under comparable environmental conditions in the field, have been called resistant. Three basic components appear to be involved in resistance. First, plants may be nonpreferred for egg-laying, shelter, or food, primarily because they lack certain physical or chemical properties. If a chemical is involved, it may be quite minute in quantity. Second, resistant plants may affect the biology of the insects adversely, causing high mortality or reducing the fecundity of an insect feeding on the plant. Third, resistant plants may be tolerant, so that they survive and produce satisfactory yields under levels of infestation that would kill or severely injure susceptible plants.

Hessian Fly

Familiarity with the life history of the hessian fly and the damage done by it is necessary to understand the problem of its control. Adults which emerge from infested volunteer or stubble look like small mosquitoes and live for only 12 to 48 hours, but each female may lay as many as 500 eggs, on the upper side of young wheat leaves. Larvae hatch and go toward the base of the stem. When fully grown, the next-to-last larval skin turns brown and hardens to form the "flax seed," a resting stage of the insect which usually lasts for a few weeks or months, but may continue for as much as 5 years if weather conditions are unfavorable.

The hessian fly, introduced about 1776 into North America in straw brought by Hessian soldiers, has spread over most of the winter wheat-growing areas of the continent.

Larvae cause several kinds of damage. Farmers associate the insect with straw that is broken over in a characteristic way. Other kinds of damage are not apparent to untrained observers. For example, one larva's infestation on an unbroken culm reduces both number and weight of kernels, thereby causing 25 to 30% less head yield and lower test weight. What has happened to chemical constituents of kernels from infested plants is unknown, but profound chemical changes found by Byron S. Miller in fly-infested seedling wheat plants suggest that such changes may be considerable. The cereal chemist should be interested in preventing such changes.

The hessian fly thrives best in otherwise good wheat years, so that yield reductions from infested culms tend to be offset by the good yield from uninfested plants and culms. Evidence from fly-resistant varieties shows that yields would have been much greater in the absence of flies. Any damage to wheat quality remains, however.

Larvae may also kill young plants or make them more susceptible to winter injury. This has been repeatedly demonstrated in nurseries by comparing a susceptible variety, such as Turkey or Tenmarq, with a partially resistant variety like Pawnee. Winter injury in fields of susceptible wheat plants often goes unnoticed for lack of an uninfested standard for comparison.

Breeding for Resistance to Hessian Fly

The first reference to a wheat variety resistant to the hessian fly was in 1785, but little concerted study was made until infestation tests of varieties began at the Kansas Agricultural Experiment Station in 1914. Several resistant varieties were found, but none was satisfactory under Kansas conditions because of poor milling and baking quality and/or low yield. Kawvale, a selection derived from a soft wheat variety, Indiana Swamp, was released in 1928 as the first fly-resistant variety in Kansas. It had fairly good hessian fly resistance, but was not entirely satisfactory in certain quality and agronomic characteristics. It has been largely superseded by Pawnee, the first satisfactory hessian fly-resistant *hard red winter wheat* released. Pawnee was derived from a cross between Kawvale and Tenmarq made at the Kansas Agricultural Experiment Station. Its development required twelve years' work by researchers in the agronomy, botany, and entomology departments of the Kansas and Nebraska Experiment Stations and in the U. S. Department of Agriculture. It was released

[1] Contribution No. 756, Department of Entomology, Kansas Agricultural Experiment Station, Manhattan. Part of a symposium on wheat breeding problems given at the AACC Tri-Section program at Manhattan, Oct. 10, 1959.

to farmers in Nebraska in 1942 and in Kansas in 1943. It carries about "50% resistance" to hessian fly and also a high level of tolerance with some infestation usually only slightly affecting yields. Its ability to yield well despite the presence of hessian fly quickly made Pawnee a favorite wheat in central Kansas, where it soon occupied 75% or more of the wheat acreage in many counties.

Ponca, released in 1951, combines the fly-resistant qualities found in Kawvale and Pawnee with a higher level of resistance derived, by way of the spring wheat Marquillo, from a durum wheat. Development of Ponca required fifteen years. In the first six generations, the work was primarily that of entomologists and agronomists of the Kansas Agricultural Experiment Station. When Ponca was released, its percentage of infestation in 27 tests in Kansas was 2%, compared with 75% for Tenmarq (susceptible) and 48% for Pawnee. The percentages illustrate differences that occur in tests where varieties are grown side by side. Where a resistant variety is exposed only to the infestation available in a farmer's field of the resistant variety, the level of infestation usually is much less. Thus resistant varieties have had an important part in reducing hessian fly population in central Kansas, where heavy losses in wheat yields occurred until after 1945.

In 1945, the last year of general distribution of susceptible varieties, the hessian fly population throughout Kansas was high, with corresponding grain losses. The growing of fly-resistant Pawnee (since 1945) and Ponca (since 1951) has reduced the population almost to zero during the last 7 or 8 years. Increases in infestation during the last 2 years along the northern and eastern borders of Kansas were only in isolated areas where large acreages of susceptible wheat varieties were grown. Most of the recent work on hessian fly has been confined to greenhouses, because the flies are not found in Kansas farmers' fields. Work must continue, however, to add new and improved characteristics to fly-resistant wheats.

Greenbugs

Hard red winter wheat needs resistance to greenbugs. This aphid has caused widespread damage in Kansas and Oklahoma at intervals of 5 to 10 years. The adults, mostly females, give birth to living young at rates up to three or four a day. The young may mature in less than a week. Among the half-dozen or more different species of aphids that feed on wheat in Kansas, the greenbug is the only one that is severely injurious. It damages wheat by injecting substances that destroy the chlorophyll and severely injure the microscopic cell structure of the plant. In the early spring an infestation may spread rapidly, and kill young wheat plants over wide areas.

A few greenbugs feeding on leaves may cause 40 to 50% loss of weight by the roots of the plant. That suggests that the material injected by the aphid is transported throughout the plant. Other experiments show that the numbers of tillers are reduced in plants injured but not killed by greenbugs.

In May greenbugs may move in and feed behind the boot, protected from their enemies. This reduces the number and plumpness of grains—another effect of an insect on grain quality.

Breeding for Resistance to Greenbugs

In their search for wheat varieties resistant to the greenbug, entomologists in Kansas and Oklahoma and the U. S. Department of Agriculture have tested more than 7,000 varieties and strains of wheat by confining aphids on them in the insectary. More than half (60%) of the strains tested have been more susceptible to greenbugs than wheat varieties currently grown, but seven or eight selections have shown considerable resistance; all are spring wheats of unknown milling and baking qualities.

Resistance to greenbugs takes the form of less destruction of chlorophyll and greater ability to withstand greenbug attack. When a resistant strain is crossed with a commercial wheat, it is possible to pick out, in the second generation, individual plants of winter-growth type that have resistance. In later generations, these plants have given rise to resistant strains of wheat with some, but not all, of the desirable characteristics of good bread wheat.

These resistant hybrids have again been crossed to commercial wheats, and a second cycle of selection has begun. We hope eventually to have available wheat varieties that possess resistance to greenbugs together with the desirable properties of good bread wheats.

The Problem in Brief

The hessian fly and the greenbug have been used as examples of entomological problems in developing new wheats. In common with many other insect pests, they reduce yields. These two insects, when not controlled, also may lower wheat quality. They are, therefore, of particular interest to cereal chemists. The least expensive, and in other ways the best, control method should be the use of insect-resistant wheat varieties. Breeding such varieties presents many problems; but resistant varieties in Kansas have reduced the hessian fly, which once was of first importance, to the status of a minor pest. There is good evidence that the effort to breed greenbug-resistant wheat varieties also may be successful. Breeding insect-resistant varieties is a continuing problem only because insect-resistant qualities must be incorporated into the newer improved varieties.

Pratt:

(Continued from page 92)

advance us professionally. We must make management aware of our worth, through communications. Once this worth has been established, I am sure that management will give us every assistance we need to build our professional status to that point where we meet the high-salaried sales people, the merchandising people, and the technical people of our customers on an equal economic, as well as professional, plane. Let's all endeavor to sell ourselves and the contribution which we can make to corporate welfare by establishing better lines of communication.

THE STRUGGLE WITH NATURAL ENEMIES:

Pathological Problems in Developing New Wheat Varieties[1]

By C. O. Johnston, Pathologist, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture

A STUDY OF the development of agriculture in the United States readily reveals the fact that, as the agricultural age of any area increases, the biological hazards of production increase. Prominent among those hazards are diseases of cultivated plants. The increase in diseases affecting wheat in Kansas is easily demonstrated.

Before the introduction of Turkey wheat by the Mennonites in 1873, wheat production was limited almost entirely to the eastern third of the state where rainfall was fairly abundant and well distributed. Only soft-seeded varieties, which had been brought from states farther east, were grown. These were mostly susceptible to rusts and to loose-smut, and those diseases were present from the beginning of wheat culture in Kansas.

Upon the introduction of Turkey, wheat production increased very rapidly and soon extended to the higher and drier plains. Scattered reports made during the early years of hard winter wheat production indicate that rusts on the Turkey wheat growing on dry uplands of the western half of the state were much less than on soft winter wheats grown in the eastern half.

Stem and Leaf Rust

As the acreage of Turkey increased, there was an increase in the incidence and severity of the rusts, even in the drier sections. For example, the great epidemics of stem rust *(Puccinia graminis tritici)* in 1904 and 1916 were felt throughout Kansas, although less severely than in the spring wheat areas of northern United States. Leaf rust *(P. rubigovera tritici)* especially has increased to a point where it is always present and usually severe in some localities nearly every year.

Both leaf and stem rust gradually became so severe that the production of resistant varieties was a necessity. Kanred, a Turkey-type wheat, was selected for resistance to both leaf rust and stem rust as well as for better yield and other agronomic characters. Kawvale was selected for resistance to leaf rust, and hybridization produced Pawnee, Tenmarq, and Comanche, all of which had some resistance to leaf rust or stem rust.

The crosses from which these early resistant varieties were selected were all simple two-variety crosses. The varieties so derived had excellent resistance for a short time, but soon appeared to be as susceptible as older varieties. It was discovered that these apparent losses of resistance were caused by changes in physiologic races of the fungus.

When new resistant varieties eliminated the old physiologic races, new races which were able to infect the new varieties increased to such an extent that they appeared to lose their resistance. For a time it was not known how this came about, because the barberry and meadow rue, on which new races of stem and leaf rust could arise through hybridization, were nonfunctional in Kansas and southward. It was known that some new races could arise by mutation, but that method was too slow to account for the rapid change in races of leaf rust. More recently it has been discovered that new races can originate by the fusion of fragments of mycelium arising from the germination of spores of different races on the surface of cereal leaves.

Thus, it has been found that the rust fungi at least are very plastic in nature and are able to change their infective capacities almost as fast as man can breed new wheats. This has placed a terrific burden on pathologists and wheat breeders. It has forced the testing of wheat and wheat relatives from all over the world in search of new and better sources of resistance. It also has brought about a realization that the broadest possible base of resistance must be established. New rust-resistant varieties such as Ponca, therefore, have three or four varieties in their parentage with resistance to many races instead of to only a few. Furthermore, complex crosses containing wild grasses such as the wheat grasses (*Agropyron* sp.) or goat grass (*Aegilops* sp.) in combination with common wheat have been used. All of this illustrates how the problems of resistance to diseases tend to keep pace with the breeding of new wheat varieties.

Smut Diseases

Among other important problems, the matter of resistance to the two smuts must be considered. Loose-smut (*Ustilago tritici*) always was present to some extent in the old soft winter wheat varieties originally grown in Kansas. The introduction of Turkey caused a reduction in the incidence of loose-smut for a consid-

[1] Contribution No. 554, Department of Botany and Plant Pathology, Kansas Agricultural Experiment Station, Manhattan. Department serial No. 710. Cooperative investigations between Kansas Agricultural Experiment Station and the Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture. Part of a symposium on wheat breeding problems given at the AACC Tri-Section program at Manhattan, Oct. 10, 1959.

erable length of time, but gradually the amount of this disease built up in Turkey. The release of Kawvale in 1932 and of Pawnee in 1943 reduced the amount of loose-smut to a very low level, since both varieties were highly resistant. The spread of Triumph, another resistant variety, from Oklahoma into Kansas also tended to reduce the amount of the disease. However, the recent release of Kiowa and Bison for other reasons in the western part of Kansas has been a step backward so far as resistance to loose-smut is concerned, because both varieties are very susceptible. This emphasizes the point that it is not always possible to advance on all fronts at once in the production of new wheat varieties. Sometimes it is necessary to sacrifice one good character for several other factors having more important effects on yield or quality.

In the early days of wheat production in Kansas, bunt or stinking smut *(Tilletia foetida)* was not a serious disease. Furthermore, the Turkey wheat brought in by Mennonite settlers had excellent resistance to bunt. However, after a number of years bunt began to build up in Turkey, and in the 1920's it was found that there were new races of bunt that were causing the trouble. Thus there were physiologic races of bunt in addition to rust, and varieties formerly thought to be resistant frequently were showing high infections. From 1924 to 1929 bunt infection ran high in Kansas wheat, but a very effective seed-treatment program, coupled with the breeding of the resistant varieties Comanche, Pawnee, Kiowa, and Bison, reduced it to a very low level. The combination of the use of seed treatment and resistant varieties has kept bunt infection at a very low level in Kansas for many years.

Virus Diseases

The older diseases discussed thus far in this report are not the only ones that have demanded the attention of the pathologist and wheat breeder in recent years. For many years certain virus diseases of wheat had been known to be present in Kansas but had never caused severe widespread losses until 1949, when wheat streak mosaic appeared in epidemic proportions in the western half of the state. Losses due to wheat streak mosaic were very severe in 1949, 1951, 1954, and 1959. The severity of the disease seems to depend on the presence of a mite, so small it can be carried by the wind. This mite is the vector carrying the virus that causes the disease. Fortunately, some varieties such as Bison, Triumph, Concho, and Kiowa have enough resistance to give considerable protection. It also is known that elimination of volunteer wheat and rather late sowing tend to control the disease.

In 1952, only 3 years after the first epidemic of wheat streak mosaic, soil-borne mosaic, another virus disease, appeared in epidemic proportions in the eastern third of Kansas. Severe losses were also recorded in 1954 and 1957. This disease is carried only in the soil and apparently persists in diseased soil for many years. Here again several varieties that were developed for other purposes have proved to be resistant. Concho and Comanche have shown excellent resistance in the presence of soil-borne mosaic.

New Disease

The latest incursion of a new disease in the hard winter wheat area was the appearance of stripe rust *(Puccinia striiformis)* in serious amounts in 1957 and 1958. In the latter year it extended from southern Texas to the Canadian border and caused considerable loss in Texas, Oklahoma, and Kansas. The occurrence of stripe rust in epidemic proportions in a mid-continental area was amazing, because the disease usually is severe principally in mountain or seacoast locations. This nicely illustrates the effect of the combination of new production areas and unusual environmental conditions upon the development of a disease in an area in which it seldom or never had been found before.

The reasons for the sudden movement of stripe rust into the great wheat-growing area of the central plains of the United States now seem fairly clear. Stripe rust has been a common disease of wheat grown in the valleys of the mountainous areas of northern and central Mexico for many years, but relatively little wheat was grown there. In recent years a great deal of very productive wheat breeding has been done in Mexico. This has produced new varieties well adapted and productive in northern Mexico and has led to a considerable increase in the acreage of wheat in the area. Some of those new varieties are very susceptible to stripe rust, so there has been a large increase of inoculum in northern Mexico.

In addition to the production and distribution of new varieties susceptible to stripe rust and to the increase in the acreage of wheat in northern Mexico, the early springs of 1957 and 1958 were marked by weather conditions unusually favorable to stripe rust infection and development. There were unusually long periods of continuously cool weather with frequent showers. These are exactly the conditions required for the development of stripe rust. Therefore, the epidemics of 1957 and 1958 were the result of the proper combination of factors favorable to the disease. Further increases of wheat acreage are expected in northern Mexico, owing to the opening of new agricultural land through irrigation. Thus another disease problem has arisen to complicate the breeding of new wheat varieties in Central United States. Fortunately, several varieties such as Turkey, Kharkof, and Cheyenne have good field resistance.

Minor Diseases

Besides the diseases discussed above, several minor diseases appear to be increasing in recent years and are demanding the attention of pathologists and wheat breeders. Speckled leaf blotch, caused by *Septoria tritici*, has become a serious disease in parts of Texas, Oklahoma, and Kansas. Glume blotch *(S. nodorum)* is abundant in wet seasons. Mildew *(Erysiphe graminis)*, which has always been present in lowland fields in wet seasons, often appears now as a troublesome early-season disease even in upland fields. Take-all *(Ophiobolus graminis)* and other root-rot diseases seem to decrease in prevalence and severity during a series of dry years but become problems again during a series of years with higher rainfall. Blackchaff *(Xanthomonas translucens undulosum)* and other bacterial diseases seem to become more prominent whenever high rainfall occurs during the spring. Flag smut *(Urocystis tritici)* came into the United States about 1920 but was unable to spread to resistant hard red winter varieties. However, it may reinvade if susceptible varieties are grown.

(Please turn to page 107)

Create More Demand for More Products b

Consumer interest in better nutrition has never been higher than it is today. As a result, products backed by strong nutritional claims are steadily gaining an increased share of every food dollar. You can take advantage of this nutritional boom and gain an edge over competition by fortifying with Merck vitamins and amino acids.

Merck offers nearly a dozen different nutrients, all easily adaptable to normal food processing operations. Consider Merck Ascorbic Acid, for example. It can give you promotable vitamin C claims for any number of products—from gelatin desserts and instant potatoes to fruit juice blends and instant drinks. Merck lysine can improve protein quality of cereals, specialty breads and other processed foods containing vegetable proteins. Vitamins B_{12} and B_6—both pioneered by Merck—are musts for all ages, are loaded with consumer appeal, give you unlimited opportunity for offering shoppers extra nutritional value in your products.

If you have new products in the works, or are looking for ways to stimulate sales of existing products—look first to Merck for the nutritional appeal, nutrients, and technical assistance you need.

For the full story call in your Merck representative now, or write directly to Rahway.

More Shoppers with MERCK NUTRIENTS

New booklet shows how you benefit from Merck's food processing laboratory. Send now for your free copy of "Merck Research for the Food Industry."

MERCK CHEMICAL DIVISION

MERCK & CO., INC. • RAHWAY, NEW JERSEY

© Merck & Co., Inc.

PRESENT WORK AND FUTURE NEEDS IN

Testing for Milling and Baking Quality of New Wheats

By J. A. Shellenberger, Department of Flour and Feed Milling Industries, Kansas State University, Manhattan[1]

EACH YEAR MANY new hard winter wheat crosses are made by wheat breeders associated with the various experiment stations in the Great Plains. Hundreds of new strains are screened for desirable plant properties such as winter hardiness, yield, resistance to disease and infestation, and the characteristics of the seed produced. Relatively few new crosses survive this screening process, but for those that do survive, the correct appraisal of milling and baking quality becomes of paramount importance.

As a service to the wheat breeder, milling and baking quality tests on hard winter wheat are conducted at several agricultural experiment stations and by the Federal Hard Winter Wheat Quality Laboratory of the U.S. Department of Agriculture. Some state laboratories contribute to the screening of varieties for milling and baking quality, but the most important program is the regional testing that is done by the Hard Red Winter Wheat Quality Laboratory located at Manhattan, Kansas.

The Manhattan Laboratory

This laboratory regularly tests the special plant breeders' samples from throughout the hard red winter wheat region, as well as testing uniform-plot, uniform-yield, and winter-hardy nursery samples which are station composites based on geographical districts. By these means, the plant breeders are obtaining information on the quality of the new crosses which are grown throughout the entire area. Varieties which show promise can be increased in each state, if desired, and comparative testing can be continued until a variety is finally discarded or approved for release by the experiment station. This is the present procedure and it is a good one, but it does not sufficiently stress the importance of releasing only varieties of outstanding performance for modern commercial bakery use. This concept cannot be overemphasized.

Problems and a Challenge

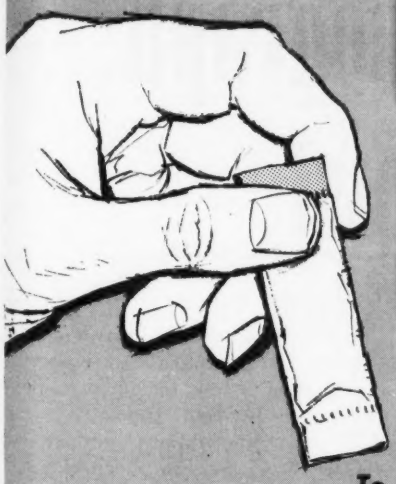
The sum-total of all the factors which make up environment is too complicated now to be subject to control. This makes it all the more important that wheat breeding for such characteristics as, for example, drouth resistance and winter hardiness be continued. It is necessary, however, to call attention to the fact that neither of these properties may be particularly important in any given year or years. The same is true of the various wheat diseases and other conditions which regularly reduce production. A new variety, released because of resistance to a disease or to drought or any other hazard, may not be subject again for several years to the particular situation it was released to withstand. For example, rust or hessian fly resistance is not of paramount importance if neither of these hazards is causing damage in a particular year.

In contrast to the situation just mentioned, a new hard winter wheat variety, when released and produced in commercial quantity, created a situation with respect to milling and baking qualities which are a matter of vital consideration year after year. The need for strong, high-protein hard red winter wheat never ceases. If a mistake in judgment occurs somewhere along the line in the appraisal of the agronomic, entomological, or pathological characteristics of a wheat release, the end result can be that the total yield is reduced. While this, of course, is a serious matter to the farmer and to those who are dependent upon the farmer, it does not necessarily change the milling and baking values. On the other hand, if the misjudgment occurs with respect to milling and baking quality, this does not influence production; hence, the new variety reaches the market and the quality of all wheat is thereby reduced. The reputation of hard red winter wheat does not provide any margin for quality misjudgment.

There is a challenge which we must accept: namely, hard spring wheat has, on the average, a better reputation for strength and good baking quality than has hard winter wheat. This opinion is held throughout the world and is reflected in open market price quotations. A situation such as this need not and will not continue, but there is no room for satisfaction or complacency on the subject of the milling and baking qualities of the wheats that have been released in the past.

(Please turn to page 107)

[1] Contribution No. 327, Department of Flour and Feed Milling Industries, Kansas State University, Manhattan. Part of a symposium on wheat breeding problems given at the AACC Tri-Section program at Manhattan, Oct. 10, 1959.

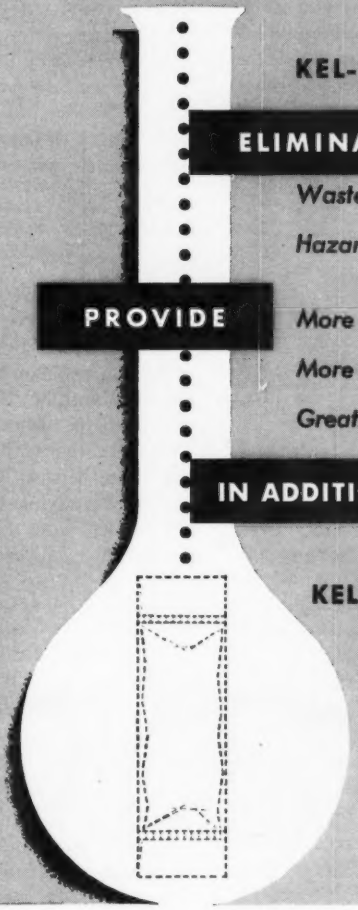


FOR YOUR CONVENIENCE

Harshaw KEL-PAK Digestion Catalyst Powders

Harshaw KEL-PAK Powders are carefully compounded mixtures of Potassium Sulphate; Mercuric Oxide and/or Copper Sulphate in sealed polyethylene packets containing sufficient catalyst for one protein determination.

To use, simply drop one packet into flask



KEL-PAK POWDERS

ELIMINATE

Messy mixing operations

Waste due to spillage and spoilage

Hazardous handling of mercury or its compounds

PROVIDE

More uniform mixtures

More accurate additions

Greater speed in adding catalyst to flask

IN ADDITION..

Polyethylene packet reduces foaming

KEL-PAK POWDERS are available in 5 formulas

#1 9.9 grams K_2SO_4; .41 gram H_gO; .08 $CuSO_4$

#2 10 grams K_2SO_4; .3 gram $CuSO_4$*

#3 9 grams K_2SO_4; .35 gram H_gO*

#4 10 grams K_2SO_4; .7 gram H_gO*

#5 15 grams K_2SO_4; .7 gram H_gO*

* Meet A.O.A.C. specifications

Write for more information and prices today.

HARSHAW SCIENTIFIC

DIVISION OF THE HARSHAW CHEMICAL CO.

1945 East 97th Street • Cleveland 6, Ohio

Sales Branches and Warehouses

Cleveland 6, Ohio, 1945 East 97th St.
Cincinnati 13, Ohio, 6265 Wiehe Road
Detroit 28, Mich., 9240 Hubbell Ave.
Houston 11, Texas, 6622 Supply Row
Los Angeles 22, Calif., 3237 S. Garfield Ave.
Philadelphia 48, Pa., Jackson & Swanson Sts.

Sales Offices: Baton Rouge, La.• Buffalo 2, N.Y.• Pittsburgh 22, Pa.• Oakland 11, Calif. Hastings-on-Hudson 6, N.Y.

FACTORS AFFECTING THE FARINOGRAM

The Farinograph Mixing Bowl

EDITOR'S NOTE: *The following is based on material contained in the AACC's new booklet, "The Farinograph Handbook." The handbook will be issued as an instructional manual during the forthcoming Farinograph Workshop to be held in Chicago May 5 and 6. All cereal chemists and technologists interested in the farinograph are invited to attend this workshop. Persons not able to attend the school may purchase copies of the instruction manual by writing to the American Association of Cereal Chemists, 1955 University Ave., St. Paul 4, Minnesota, AFTER MAY 9.*

FOR AN OPERATOR of any instrument to be effective and proficient he must have a thorough knowledge of the functions of the various parts of the instrument, as well as a technical knowledge of the measurements of the test. It is the purpose of this brief note to acquaint the operator with the functions of these various parts of the farinograph, their importance, and their effect on the farinogram.

The Bowl

We shall first discuss the farinograph mixing bowl, since this is the part where the dough is developed. Studies have been conducted to see what effect the farinograph mixing bowl has upon the farinogram. The following is a brief resumé of the results of these studies.

In this investigation the constant dough weight farinograph method with a 300-g. bowl was used. Three farinographs and farinograph bowls were employed. The flours were commercially available bakers' grade types.

The data and curves shown are representative results. They demonstrate some of the effects farinograph bowls can have on farinograms.

In Table I are data obtained from three different farinographs, using the original bowl which came with the equipment on a single flour. These data show that there is a range of 3 minutes in dough development time, 6 minutes in stability time, and 9 valorimeter units. From these results it is apparent that there is a difference in the farinogram values.

To eliminate the influence of the farinograph (the instrument other than mixing bowl), these three bowls were then used on one farinograph. The data obtained are recorded in Table II. It will be noted from these data that there is still quite a variation in the farinograms obtained from the different mixing bowls, even though they were placed on the same farinograph.

TABLE I
DIFFERENT BOWLS AND FARINOGRAPH — SAME FLOUR

Farinograph No.	Bowl No.	Arrival Time	Peak	Stability	M.T.I.	Valorimeter	Absorption
		minutes					%
1	1	1.5	4.0	9.0	30	59	62.2
2	2	2.0	7.0	13.0	15	68	61.4
3	3	1.5	6.0	15.0	30	66	61.4

The next step was to take one mixing bowl and run the flour on the different farinographs with this bowl. The data from this experiment are shown in Table III. From these results it can be seen that the agreement between the various farinograms when the same bowl is used on different farinographs is much better than either the results of the individual farinograms or the different bowls on the same farinograph. This shows the important effect the mixing bowl has upon the farinogram.

TABLE II
DIFFERENT BOWLS — SAME FARINOGRAPH

Bowl No.	Arrival Time	Peak	Stability	M.T.I.	Valorimeter	Absorption
	minutes					%
1	1.5	4.0	9.0	30	59	62.2
2	1.5	5.5	13.5	20	66	61.2
3	1.5	6.0	16.0	15	68	61.5

TABLE III
ONE BOWL — DIFFERENT FARINOGRAPHS

Farinograph No.	Arrival Time	Peak	Stability	M.T.I.	Valorimeter	Absorption
	minutes					%
1	1.5	4.0	9.0	30	59	62.2
2	1.5	3.5	8.5	25	58	62.7
3	1.5	3.0	8.0	30	56	62.0

In Fig. 1 are shown the results obtained on two flours from two different farinographs. From the figure as well as from the readings or data in Table IV, there appears to be some difference between the two flours. In carefully studying the data in Table IV you will note that for bowl 1 the flour sample marked No. 2 would be

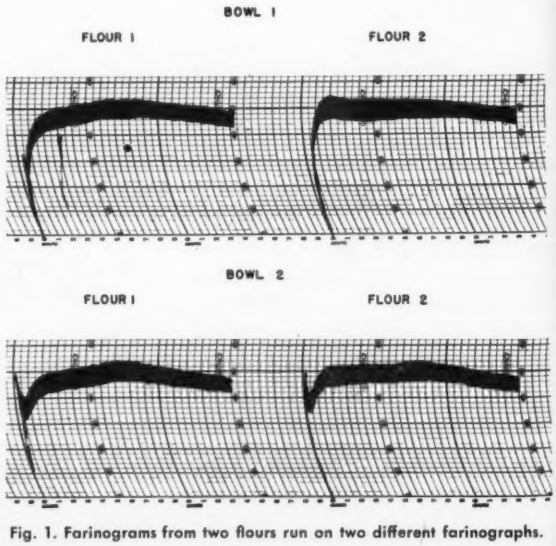


Fig. 1. Farinograms from two flours run on two different farinographs.

classed as weaker than flour 1 using the valorimeter or dough development time. However, in the case of bowl 2 the results would be just the opposite. In fact, the results of bowl 2 are more in line with the actual baking performance of these two flours. Therefore, it is important to know the characteristics of your farinograph bowl, since these two flours could be rated differently depending on the condition of the bowl.

This brief review demonstrates the importance of the condition of the bowl. It is readily seen that an operator who is not aware of the characteristics of his bowl can be misled in interpreting his results if his bowl does not perform properly.

TABLE IV

TWO FLOURS — TWO FARINOGRAPHS

Bowl No.	Flour	Arrival Time	Peak	Stability	M.T.I.	Valorimeter	Absorption
		minutes					%
1—1	1	3.0	8.0	11.0	30	69	62.8
2—1	2	1.0	2.0	12.5	10	60	60.3
3—2	1	3.0	7.5	9.0	40	66	63.9
4—2	2	1.5	8.0	11.0	30	69	63.0

Heyne:

(Continued from page 96)

Marquis or Turkey wheat varieties were available for the Great Plains farmers, we would in a few years become alarmed over the prospective shortage of wheat, just as we are now concerned about the surplus. Finding and adding new germplasm to our adapted varieties is a long-time, continuous program that cannot be started and stopped with ease.

Quality

In discussing wheat breeding problems, quality is always of primary concern. Quality in wheat is also a complicated problem and will be discussed later in this symposium, but high quality, diseases, insect resistance, and numerous agronomic characteristics must be incorporated into one variety. What are the chances of combining together in one plant these many major and important characteristics? More than 20 distinct features of the wheat plant have been mentioned that are considered to have a simple genetic explanation, and theoretically can be moved easily from one variety to another.

For illustration, we will assume that variety A has five desirable characteristics and variety B has five others. The first step is to cross these two varieties to obtain the first generation (F_1). In the second generation (F_2), these ten characters are assorted and recombined at random. To obtain the plant with all the ten desired features that would breed true, we would expect only one such plant out of 1,048,576 (4^{10}) in the F_2 generation. It is not possible to work with this many plants, so breeding procedures have been developed that help us, such as adding only one or two desirable traits at a time to a good, adapted variety. Even though a number of procedures of breeding are known, the plant breeders generally work with more than one or two characters, so growing and studying a sufficient number of plants is one of the major breeding problems.

Much progress has been made in breeding better wheats, but many problems remain to be worked on in order to maintain what we now have. Further improvement will come only with the concentrated efforts of biological specialists working together.

Shellenberger:

(Continued from page 104)

Uniform Program Needed

In my opinion, the time is now opportune to establish, for the entire hard red winter wheat production area of the Great Plains, a uniform testing program for all new wheats considered for release by any of the agricultural experiment stations. This program would involve the cooperation of directors and plant breeders of agricultural experiment stations of the Great Plains in submitting all wheats being considered for release for at least two years of large-scale collaborative testing by the milling and baking industries. Industry's appraisal of new wheat would thus be made available to plant breeders and directors of experiment stations. This would not prevent the directors from using their judgment regarding the release of new varieties, but it would provide them with the opinions of industry in advance of release rather than later. Since varieties are not necessarily grown in the states or areas for which they were approved, nor in areas where their specific properties may be most suitable, it is obvious that the release of a new variety is a consideration involving the entire Great Plains region and not just a state or local area.

The next step in bringing such a program into permanent use is to obtain the cooperation of all the directors of agricultural experiment stations in the Great Plains and to arrange for suitable test plots. The wheats subject to testing must be representative of the inherent quality of the variety or varieties being tested, or misleading information will result. The start of such a program has already been made. For several years, large-scale milling and baking tests of new wheat varieties, in comparison with varieties whose properties are known, have been conducted in several of the states in the hard winter wheat producing areas. What is needed now is a better-coordinated testing program, including a mandatory agreement among all the experiment stations that no new wheat variety will be released until at least two quality reports have been received by the director's office from the industry testing program.

Johnston:

(Continued from page 101)

Thus, the disease problems that must be considered in the production of new wheat varieties are many and varied in nature. They complicate the progress of wheat breeding and seem to be constantly increasing in distribution and severity. Along with other problems, they demand constant vigilance, make the task more difficult and costly, and tend to extend the time required to produce new varieties.

The AACC's largest local section is the appropriate host for the largest technical program ever presented at an Annual Meeting, the

45th Annual Meeting

A NEW RECORD will be set when the American Association of Cereal Chemists holds its 45th Annual Meeting in Chicago during the week of May 1 to 5. Seventy-three technical papers, the largest number ever presented at an AACC meeting, will be available to interest technical personnel in the cereal industry.

Diversified Program

Program Chairman Robert Koch of the Quartermaster Food and Container Institute, Chicago, has assembled a program that is truly, "diversified." Readers of this publication will no doubt recall the breadth and depth of the many titles that appeared in the Preliminary Program (March issue). While the emphasis is on research, the applied area is well covered with sessions on "Process Control in the Fermentation Industry", "Baking and Baking Technology", "Feeds and Feed Supplements", and "Methods and Gadgets Useful in Control." All registrants will be particularly interested in the symposium on Marketing Research and Statistics.

Guest Speakers

Members of the AACC attending the meeting will have the opportunity to hear several outstanding guest speakers. W. E. Glennon, executive president of the American Feed Manufacturers Association, will address the meeting on Monday morning, May 2. Mr. Glennon has been with the AFMA since 1945. He's a graduate of the University of Illinois School of Business and Commerce and became associated with the cereal industry in 1934.

"Ed" Glennon is active in a number of groups connected with the grain trade such as the Midwest Shippers Advisory Board, the National Grain Trade Council, and Chicago Feed Club.

Representing the milling industry will be Ellis D. English who will address the convention in his dual role as president of Commander-Larabee Milling Co. and president of the Millers' National Federation. Mr. English has been in the flour business most of his life. He started as a flour salesman in Texas with the old Rea-Patterson Milling Co. Early in 1934, Commander-Larabee acquired the G. B. R. Smith Milling Co. of Sherman, Texas, and with it, Ellis English who was sales manager. From Texas he moved to Kansas City and southwestern sales manager of Commander-Larabee. In 1947 he was made executive vice-president and moved to Minneapolis. He was elected president of the company two years later.

AACC members who are normally concerned with the technical phases of development and/or production will get a glimpse of the problems involved in marketing and selling during the special session on Marketing Research. To lead off this topic, the convention will hear from Albert R. Whitman, vice president of the Campbell-Mithun advertising agency. Mr. Whitman started his advertising career in 1933 as an office boy at Benton and Bowles in New York. He served as account executive and then account supervisor, on such food products as Log Cabin Syrup, Maxwell House Coffee, Sure-Jell, Certo, Baker's Chocolate Products and Diamond Crystal Salt.

He also served as account executive for a Procter & Gamble product and supervised the advertising and public relations program for the Prudential Insurance Company of America. During the war he was first with the Office of War Information and later National Director of Fuel and Stove rationing.

In 1950 he joined Campbell-Mithun, Inc. in Minneapolis as executive vice president, partner, a member of the Agency's board of directors, and head of the agency's Plans Board. For the past ten years he has been active in the development of new products and has worked closely with the management of the Pillsbury Company and its research staff in new product development and marketing.

Presidential Address

AACC President D. B. Pratt, Jr. will talk briefly on Association affairs and will conclude his remarks with some observations on the state of research in the cereal industry. Elsewhere in this issue readers will find Pratt's thoughts on communications as he addressed the AACC's Local Sections across the country.

Local Arrangements

Persons attending the meeting will find that the convention facilities available at the Morrison Hotel are among the newest in the country. This will add to the enjoyment of the meeting by providing ideal conditions for the proper presentation of the technical papers. Two concurrent sessions will be in operation all day Tuesday and Wednesday. Authors have been warned that the time schedule will be adhered to without exception.

Adding to the enjoyment of the meeting, our hosts in Chicago have provided *advanced registration* to eliminate any unnecessary delays in the operation. Even if you are not sure you will attend, you should send in the advance registration card. DO NOT SEND ANY MONEY. Your cooperation in the registration procedure will help the local arrangements committee provide you with a smooth running convention.

Make the vanilla TASTE TEST

Planifoline®
(imitation vanilla concentrate)

(YOU CAN'T TELL THE DIFFERENCE)

Vanilla

Make the COST TEST

Vanilla bean costs are climbing . . . *Planifoline* (from plant extractions only) is today's quality-economy answer to your vanilla formulations . . . no artificial color added.

Florasynth
LABORATORIES, INC.

Make the taste test . . . the cost test . . . and you'll decide on *Planifoline* . . . available in one to 10-fold concentrates, oleoresins, and imitation vanilla sugars of varied strengths.

EXECUTIVE OFFICES: 900 VAN NEST AVE., (BOX 12) NEW YORK 62, N.Y.
CHICAGO 6 • LOS ANGELES 21
• Boston • Cincinnati • Detroit • Dallas • New Orleans
• St. Louis • San Francisco
Sales Offices in Principal Foreign Countries

Stop at Florasynth's Exhibit (Booths No. 24,25), I.F.T. Meeting, May 15-19, Masonic Temple, San Francisco

American Association of Cereal Chemists

OFFICIAL REPORT FOR 1960

ANNUAL REPORT OF THE TREASURER, 1959

The annual financial report of the Association is herewith presented. Our operation for 1959 reflects a decided reversal in the downward trend which has plagued the Association for the past few years. The increase in the Association's assets of $3,866.71 can be favorably compared with the 1958 decrease of $5,950.21. The impact of the increased dues, increased revenue from subscriptions, advertising, and the annual meeting is reflected in this financial report. CEREAL SCIENCE TODAY has not as yet reached a break-even point, but the operating deficit is nearly $1,800 less than in 1958.

The membership of the Association does not show much of an increase. We now have 1,103 active members, 55 sustaining, 56 corporate. Our new-member applications to date are about the same as in 1959.

It is quite apparent that our organization is in a much better financial position than it has been for the past few years and the outlook for 1960 is good.

Respectfully submitted.

MARJORIE A. HOWE, *Treasurer*

Results of Operations, 1959

Income:		
Memberships	$20,840.00	
Subscriptions	15,678.03	
Advertising	14,788.74	
Reprints	3,572.24	
Back issues	2,053.57	
Transactions	130.98	
Interest	419.00	
Annual meetings (surplus and reimbursement)	8,069.52	
Miscellaneous, AACC	23.15	
Sanitation workshops	619.27	
Miscellaneous publications	324.32	
Monograph, Vol. I	55.68	
Monograph, Vol. II	1,047.54	
Decennial Index	104.00	
Cereal Laboratory Methods	1,478.36	
Total		$69,204.40
Expenses:		
Printing and engraving	$25,078.18	
Reprints	2,708.10	
Publication envelopes	1,154.00	
Salaries	18,848.45	
Office supplies	1,980.27	
Postage	2,414.70	
Advertising commission	3,005.46	
FICA payments	276.24	
FICA accounts payable	52.01	
Membership Directory	348.22	
Annual meetings	2,234.58	
Monograph, Vol. I	38.43	
Monograph, Vol. II	382.57	
Cereal Laboratory Methods	74.00	
Office overhead	1,754.03	
Reimbursement to allied trades	216.94	
Depreciation	415.75	
Bad debts and discounts	120.63	
Decennial Index	100.00	
Miscellaneous, AACC	1,832.19	
Miscellaneous, publications	1,102.14	
Total		64,136.89
Association assets, December 31, 1958		16,122.98
Increase in assets, 1959	$ 5,067.51	
Reduction in Monograph inventory, 100 books sold at $4.70	470.0	
Reduction in CLM inventory, 140 books sold at $5.22	730.80	
Increase in assets		3,866.71
Association assets, December 31, 1959		19,989.69

Distribution of Surplus to Activities 1959 Books

Publications:			
Assets, December 31, 1958 (red)		$ 2,809.52	
Income, 1959	$50,436.88		
Expenses, 1959	50,973.42		
Operating deficit		536.54	
Assets, December 31, 1959 (red)			($ 3,346.06)
Association:			
Assets, December 31, 1958		5,979.31	
Income, 1959	16,081.94		
Expenses, 1959	12,621.59		
Operating surplus		3,460.35	
Assets, December 31, 1959			9,439.66
Monograph: Vol. I			
Assets, December 31, 1958		855.81	
Income, 1959	55.68		
Expenses, 1959	38.43		
Operating surplus		17.25	
Assets, December 31, 1959			873.06
Monograph: Vol. II			
Assets, December 31, 1958		2,030.94	
Income, 1959	1,047.54		
Expenses, 1959	400.49		
Operating surplus		647.05	
Inventory, December 31, 1958 (195 books at $4.70)	916.50		
Inventory, December 31, 1959 (95 books at $4.70)	446.50		
Decrease in assets - inventory reduction		470.00	
Assets, December 31, 1959			2,207.99
Decennial Index:			
Assets, December 31, 1958		667.07	
Income, 1959	4.00		
Allocation	100.00		
		104.00	
Assets, December 31, 1959			771.07
Cereal Laboratory Methods:			
Assets, December 31, 1958		9,399.37	
Income, 1959	1,478.36		
Expenses, 1959	102.96		
Operating surplus		1,375.40	
Inventory, December 31, 1958 (566 books at $5.22)	2,954.52		
Inventory, December 31, 1959 (426 books at $5.22)	2,223.72		
Decrease in assets		730.80	
Assets, December 31, 1959			$10,043.97
Total assets, December 31, 1959			$19,989.69

Assets and Liabilities, December 31, 1959

Cash on hand:		
Checking account	$25,629.31	
Petty cash	330.34	
		$25,959.65
Current liabilities:		
Balance due on Federal taxes	251.30	
FICA taxes—accounts payable	52.01	
Dues received in advance	14,920.00	
Subscriptions received in advance	10,056.80	
Exhibits, Chicago meeting	1,850.00	
Farinograph Workshop	95.00	
Sanitation Series	865.00	
Royalties, Vol. II, Monograph	382.57	
		28,472.68
Cash position (red)		2,513.03
Assets:		
Accounts receivable (1959)	1,238.31	
Series G bonds	4,000.00	
Series F bonds	10,219.00	
Equipment	3,741.77	
Monograph inventory	446.50	
CLM inventory	2,223.72	
ASBC (amount due AACC)	633.42	
		22,502.72
Association assets, December 31, 1959		$19,989.69

Auditor's Report

I have examined the attached statement of financial position of the American Association of Cereal Chemists as of December 31, 1959, and the related statements of operations and surplus for the year then ended. The examination was made in accordance with generally accepted auditing standards.

In my opinion the attached statements are substantially accurate and present fairly the position of the Association as of December 31, 1959. The safeguarding of Association assets, including proper maintenance of accounting controls, is considered adequate.

JOHN D. POWELL, *Accountant*

Report of the Board of Directors

The Board of Directors met in Minneapolis on January 18, 1960. At this meeting, a number of significant actions were taken which will be of interest to the entire membership.

Routine approvals of interim decisions of the Board were handled, such as fees for the Farinograph Workshop and Sanitation review service. The annual report of the Treasurer, Monograph Editor, Managing Editor, Editor of CEREAL CHEMISTRY, Editor of CEREAL SCIENCE TODAY, and budget for 1960 were accepted.

At the request of the Technical Policy Committee Chairman (K. L. Harris), a policy for guidance in presentation of methods to be included in *Cereal Laboratory Methods* was adopted.

The Board of Directors formally adopted the term *extensigraph* to be used in all technical publications where reference is made to the use of a dough extension device. This is a generic term and avoids the use of copyrighted names. In addition to this, a formal policy was adopted regarding the use of committee reports or unreported committee activity for any purposes of advertising; i.e., committee work is confidential and none of its work can be used without permission from the Board of Directors.

As concerns convention activity, invitations were received from both New York and Denver for 1966 and tabled for action at a later meeting. Reports were received from the local arrangements and program committees for the Chicago meeting. Hugh Fetty and Byron Miller were approved as local arrangements and program chairmen for the Dallas meeting in 1961. The situation as concerns sales responsibility for exhibit space was clarified.

Finally, several actions were taken in terms of improving on business efficiency; constitutional amendments were proposed and discussed which will speed up handling of certain business functions. These will be presented to the membership for approval at Chicago. Authorization for purchase of new equipment for our executive offices was also discussed and acted upon in a favorable manner. Salaries for our paid executive staff were discussed as well as institution of some fringe benefits; both were approved.

The entire board was in attendance at the January 18 meeting and your officers are deeply indebted to the board members for their willingness to contribute in this way to the successful operation of our Association. We are also indebted to various invited guests for their contributions and the guidance which they gave the Board in achieving prompt and considered decisions.

D. B. PRATT, JR., *Chairman*

Report of the Editor of CEREAL CHEMISTRY

The six issues of CEREAL CHEMISTRY published in 1959 (Vol. 36) contained 580 pages, comprising 52 research papers. The 1958 issue consisted of 502 pages and also contained 52 papers.

A total of 84 manuscripts were received in 1959; of these, two have been published, and 38 have been accepted and are awaiting publication. Nine manuscripts have been withdrawn or rejected and 35 are under review.

There is a large backlog of manscripts on hand and it is hoped that funds will be available for the publication of enlarged issues during the early part of 1960.

Under the rotation scheme established in 1954, two of the eight members of the Editorial Board retire each year. C. E. Bode and George Peckham completed their tenure in December, 1959, and R. E. Larsen and T. J. Schoch have been appointed to fill these vacancies.

The Editor is indebted to the members of the Editorial Board for their helpful counsel and advice during the past year. Also, thanks are due to many members of the AACC as well as to other scientists who have acted as reviewers.

W. F. GEDDES

Report of the Editor of CEREAL SCIENCE TODAY

As CEREAL SCIENCE TODAY completes its fourth year of publication, its role within the AACC program has become firmly established. It provides a medium for publication of review and technological papers. Through it, communication between AACC members has been facilitated. The cereal chemist's work is made known and explained to management of cereal processing industries.

An increasing proportion of the papers presented at annual and section meetings are published in CST. It has not been possible in the past year, because of budgetary limitations, to publish all of the meeting material that might have been included. Nevertheless, the editor has continued to solicit articles where this seemed de-

sirable to provide a balanced editorial content. Further articles are planned, for example, in the series describing various organizations that are supported by or serve the technical interest of cereal processing.

Technical committee chairmen might make greater use of CST, both as a means of recruiting interested persons for committee work and as a medium for reporting committee objectives and accomplishments to the AACC membership.

Some changes have been made in editorial staff during the past year. More help can be used. Members who would like to work on this publication are invited to communicate with the editor.

PAUL E. RAMSTAD, *Editor*

Report of the Managing Editor of Association Publications

The year 1959 was a good year for AACC publications. CEREAL CHEMISTRY reached an all-time high in circulation and total income. CEREAL SCIENCE TODAY, while not yet in the black, showed the best year since its initial appearance in May of 1956. With full support of the AACC membership we should be able to push CST's advertising sales to new records during the coming year. The more you support CST among your suppliers, the better publication we will be able to provide. Advertising income is the key to financial stability for CST. Your active cooperation in selling CST as an effective advertising medium and in letting your suppliers know you read it will mean the difference between an average sales year and a record sales year.

Copies of *Cereal Laboratory Methods*, 6th Edition, are still available but going fast. Sales of Monograph II have about stopped since less than 50 books remain. The AACC office now handles the sale of Monograph I (Enzymes) having bought the remaining inventory from Interscience Publishers.

The future for AACC publications looks bright with only a cloud or two to mar the scene. Our chief problem will be in controlling the ever-increasing cost of printing while trying to provide for the increasing volume of material being submitted to both of our journals. Your Managing Editor is seeking fresh approaches to the cost problem by considering some of the newer methods of machine composition and printing. Perhaps the current developments in photo composition might be of some use to us. A special report on this subject will be made at the annual business meeting on May 5.

R. J. TARLETON

Advertising

This year the Advertising Committee promoted a philosophy to our current and potential advertisers. We urged them to make their ads creative, informative, challenging, and stimulating. In this manner we knew they would have more responsible responses and active actions from our readers.

Every page in CEREAL SCIENCE TODAY, ad or editorial, should be an experience with equal impact.

Many of our advertisers are responding by telling us more about their specialized skills, talents, and products with more creativity and continuity in their advertisements in CEREAL SCIENCE TODAY.

DAVID L. CARPENTER, *Chairman*

Employment

The report of this committee for its work during the past year might well be a repetition of last year's report.

The applicant list is outnumbered by the opening list by a ratio of three to one. In other words, there are three openings for every applicant who wishes to make a new connection.

As a result of this situation, applicants have become very careful in selecting the openings they accept. They do not accept the first position which is offered.

The committee could locate many more applicants than are listed in its files, especially those graduates who have had about ten years of experience.

It is believed that this is a very good indication that cereal chemists are being recognized as assets in an organization rather than necessary evils which must be tolerated. How different is the attitude today with regard to cereal chemists as compared to thirty years ago.

ROWLAND J. CLARK, *Chairman*

Membership Recruitment

We appreciate the fine cooperation extended by each of our Sections in handling the membership survey form which was distributed last year. Some returns were still being received last fall, but for all practical purposes we have considered the membership survey completed.

A follow-up of the survey is being made by sending an informal, eye-catching letter to each prospective member. Each Section is to be informed of those persons to whom a mailing has been made, with the hope that the local membership chairman will be able to add his personal touch to the invitation to membership.

As of the February printing of CEREAL SCIENCE TODAY 29 new members had joined the National Association. These memberships were due mostly to personal contacts outside of the National Membership Committee. This illustrates once again the importance of each AACC member acting as a one-man membership committee whenever the opportunity presents itself. Word-of-mouth advertising and personal contact can do a great deal to enlarge our membership roster.

DONALD B. DAVIS, *Chairman*

Membership Applications

During the period March 3, 1959, through February 15, 1960, 71 applications were processed by the committee. Of these 68 were active members and 3 were sustaining.

Breakdown of new active members: U.S. and Canada, total of 61 new members; only 5 of these from Canada.

Foreign memberships were approved as follows: Belgium, Korea, Scotland, England, and Pakistan, one each; Australia, two.

ROBERT B. KOCH, *Chairman*

Monograph Series — Monograph III

The first stage of the monograph project may be considered as the organizational phase. This phase was nearly completed last year. During the present year the project has progressed considerably.

Outlines for all chapters have now been received. Two of the sixteen chapters have been completed in draft. The remaining authors have all made a beginning on the individual chapters.

There have been some minor difficulties. A new author had to be found for one chapter and additional assistance had to be sought for authors of two other chapters. It mus

be remembered, however, that the work must be done over and above the normal duties of the authors, and some accommodation will be necessary.

The editor wishes to take this opportunity to express his appreciation for the devoted service of the chapter authors.

I. HLYNKA, *Editor*
W. B. BRADLEY, *Chairman*

Nominating

With the assistance of the officers of local sections and others of the members, the Nominating Committee prepared a ballot of three names for each of the following offices: President-Elect, Treasurer, and Director. From these names the Association membership, in accordance with the By-Laws, selected two nominees for President-Elect and Director, and three for Treasurer.

The Nominating Committee expresses its great appreciation to all of those who assisted in its work.

WELKER G. BECHTEL, *Chairman*

Publicity

Your committee is happy to report that 1959 was a record year for AACC publicity. The trade press gave us excellent cooperation in bringing the activities of our Association before their readers. The Washington meeting was well attended by the press and from all indications they were pleased by the facilities provided. Complete press kits were available which contained manuscripts and summaries of the talks given by the major guest speakers. Daily releases on technical papers were also prepared and distributed. In addition the committee assisted the press in obtaining personal interviews with the speakers.

Your chairman regrets that personal and business reasons prevent him from continuing with committee work in 1960. He would like to thank Frank R. Schwain, a member of the committee, and Richard Hale, Chicago publicity chairman for their support and cooperation. For the success of the Washington meeting, a special note of thanks to Mrs. Panalee T. Ikari.

WILLIAM SIMCOX

TECHNICAL COMMITTEES

Technical Policy Committee

During 1959-60, the Technical Policy Committee has been functioning mainly to support the forthcoming revision of *Cereal Laboratory Methods.* Individual committees are charged with evaluating methods in the 6th edition of *Cereal Laboratory Methods* as required, conducting the work necessary to develop new methods, and to continue to carry forward the work of the Technical Committees.

Some preliminary technical committee reports for this year appear in this issue of CEREAL SCIENCE TODAY. Others will be submitted to the Technical Committee after final review at the 1960 Annual Meeting. Each technical committee will have a meeting scheduled on May 5, and reports finalized at these meetings will be acted on at an open meeting of the Technical Policy Committee that same day.

The Chairman calls particular attention to the work of the Physical Testing (Farinograph Standardization) Methods Committee — a report is being published in this issue of CEREAL SCIENCE TODAY — and to that of the Sanitation Methods Committee for the newly formed AACC Sanitation Series flour and corn meal samples.

Progress is being made in all areas of our work, but no technical committee reports are final at the current writing.

I note with deep regret the recent and unexpected passing of Rae Harris, Chairman of the Experimental Milling Committee.

KENTON L. HARRIS, *Chairman*

Food Protection Committee

The basic structure and functions of the Food Protection Committee were unchanged from previous years. It continues to deal with posible public health problems associated with use of chemicals in the production, processing, packaging, and storage of food. It operates primarily through permanent and *ad hoc* subcommittees. Some 50 scientists served in these groups during the year.

The Committee completed preparation of two reports. "Problems in the evaluation of carcinogenic hazard from use of food additives" suggests procedures for estimating carcinogenicity and attempts to develop some general principles and guides of use in evaluating possible hazards. This report has been published as NAS-NRC Publication 749, December 1959. "Principles and procedures for evaluating the safety of food additives" is a revision of earlier statements of the Committee on this subject.

Some activities of the subcommittees are outlined:

The Subcommittee on Carcinogenesis completed the preparation of its initial report.

The Subcommittee on Food Technology had two active projects, the revision of "The use of chemical additives in food processing" and the preparation of a statement on functions and benefits of food additives. The former of these projects is being carried out primarily at Geneva, New York, under the leadership of D. B. Hand and W. B. Robinson.

The Subcommittee on Toxicology completed the preparation of "Principles and procedures for evaluating the safety of food additives." It reviewed information on the toxicology of the glycerides of lauric acid and prepared a draft report of its findings. The latter project was undertaken after statements in Standards of Identity of Foods and an FPC publication indicating harmful properties of these glycerides were questioned. Specifically, the committee received requests from the British Ministry of Agriculture, Fisheries, and Food and from interested American industrial concerns to reveal the basis for the implication of toxicity.

The *ad hoc* Subcommittee on Public Information continued to seek ways in which FPC might better inform the public of the reasons additives are used in foods. It recognized that FPC is not organized primarily to prepare material for lay audiences. It did, however, recommend that the committee prepare a semitechnical statement on the functions and benefits of additives, that committee members participate actively in conferences and symposia to present the viewpoint of FPC, and that the committee prepare exhibits for display at scientific meetings.

Two *ad hoc* groups appointed to advise FPC on possible participation in compiling a *national food additives codex* have reported that such a compilation is desirable and that FPC is an appropriate agency in which to base the activity. Financial and personnel needs for the project

were estimated by these groups and reported to the committee.

FPC has accepted the report and indicated its willingness to undertake or sponsor the compilation of the codex if continuing support at an adequate level can be assured.

A symposium on special problems in the toxicology of food additives was held in Washington on December 10th in connection with the annual meeting of the Liaison Panel and a concurrent meeting of the Food Protection Committee.

The committee enjoys continued support from industry, commercial laboratories, and consultants. About 140 such organizations or individuals made financial grants for support of FPC during the year. Their representatives and representatives of trade associations, scientific and technical societies, and government agencies make up a Liaison Panel from which the committee obtains help through consultation, receipt of information, and general encouragement.

W. F. GEDDES, *AACC Representative on Liaison Panel*

Bread Staling

The committee reviewed the thirty papers published in CEREAL CHEMISTRY on the subject of bread staling since 1946, finding that only one utilized a method from *Cereal Laboratory Methods*. In only five cases did an author use a method previously published. It is apparent that methods for bread staling are not meeting the needs of investigators.

The committee studied each method in Section 85 and will make a specific recommendation regarding suitability for the new edition of *Cereal Laboratory Methods*.

Two new methods for compression testing of bread are being studied.

LLOYD CROSSLAND, *Chairman*

Cracker Flour

Thermal behavior: There is an increase of temperature in flour during its handling and storing in bulk. The first increase of 3° to 5°F., regardless of the seasonal changes of temperature, is introduced during the transfer of the flour from the bulk car into the storage bin. It is caused by the compressed air (if used) or by the friction of rapidly moving flour particles and air. The second increase (up to 6°F. per one week) occurs in the storage bin. The biochemical reactions and the moisture adsorption by the flour are exothermic and therefore are internal source of the heat energy, and are accelerated by the hydrostatic pressure of the flour. The third increase (4° to 7°F.) occurs during the transfer of flour from the storage bin into the mixer. The nature of the heat is similar to that between bulk car and storage bin. If proper measures are not taken to check temperature increases, the temperature of the flour coming into the mixer will be too high ("hot flour") and will increase the sponge setting (70°F.) and dough setting (84°F.) temperatures above the desirable levels. The temperature of the flour, coming into the mixer, should be below 80°F.

Storage: Storage bins should have a temperature control (60° to 70°F.) and be located and constructed so that the temperature is independent of the outside atmospheric conditions, and so that that there is no moisture condensation inside of the bins.

Moisture: There is much greater uniformity of moisture in the bulk than in the bagged flour and with an adequate temperature control of the bulk flour the uniformity of the finished product is also increased.

JAN MICKA, *Chairman*

Experimental Milling

A new flow sheet and purification method is being studied with the purpose of recommending its inclusion in the 7th edition of *Cereal Laboratory Methods*. This procedure employs stainless-steel sieves in place of the cloth sieves recommended in the 6th edition, resulting in more uniform granulation and faster milling. The product seems to be fully equal in quality to that produced by the original methods. The form of the preliminary instructions for cleaning the sample before milling, and the description of accessory equipment used in experimental milling, are also being studied for possible improvement.

No change in hard wheat batch milling has yet been considered by the committee, largely because interest now appears to be concerned with continuous milling.

RAE H. HARRIS, *Chairman*

Fat Acidity

A collaborative study of methods of fat acidity determinations involving ten laboratories is currently under way. It is anticipated that all results will be in soon, but until they are, no progress can be reported. The results of this study will be used as a guide for specific recommendations to be presented at Technical Policy Committee meetings in May 1960.

ROBERT L. GLASS, *Chairman*

Flour Particle Size Analysis

On the basis of studies completed to date, this committee cannot recommend specific test procedures at this time.

To our knowledge, the type of work we have undertaken represents a pioneer effort in this field. We are working, either directly or by liaison, with the AOM and ASTM and have contacted many of the allied trades regarding methodology in this field. While much research has been performed within a single laboratory, we are unaware of any reported studies of the experimental error expected between laboratories for the determination of size distributions.

This committee believes at least *two* distinct methods are required for the determination of particle size distributions. These are categorized as (1) Sieve Analysis, which may be defined as applicable to materials having most particles larger than about 100 microns, and (2) Subsieve Analysis, which may be defined as applicable to materials having most particles smaller than about 100 microns.

To the general membership we have made little progress, but as chairman I feel the work of the committee members should be highly commended. We have had two meetings in Minneapolis to discuss the results of exchanged samples and to plot our future work. A study of the variability of individual screens is currently under way and I'm sure the results of this and a previous study will be most enlightening to our membership.

While we cannot submit a "tentative method" at the May meeting, 1960, I'm confident we will have concrete suggestions, based on reliable data, by May 1961.

BEN GROGG, *Chairman*

Macaroni Products Analysis

Excellent progress has been made by the Macaroni Products Analysis Committee during the past 7 months.

Twenty-one sections in the 6th edition of *Cereal Laboratory Methods* have been examined by the committee; some changes have been made and these are ready to be submitted to the Technical Policy Committee for First Approval. In addition to this, one section has been rewritten and is now being considered by this committee. A number of new test procedures and other suggestions are also under consideration.

LEONARD D. SIBBITT, *Chairman*

National Check Sample Service

Approximately 175 Association members subscribe to one or more of the six categories which are available on a monthly and, in some cases bimonthly, basis. The categories include Soft Wheat Flour, Hard Wheat Flour, Feed, Sanitation, Farinograph, and Amylograph.

The Doty Technical Laboratory annually sends each Association member a listing of the services that are available, together with the annual subscription price. The series is begun each October.

A sample is then sent to each subscriber for analysis. The subscriber then sends his analysis of the sample to a check sample service committeeman, who in turn averages the analyses of all subscribers and then sends a coded copy of all of the analyses to each of the subscribers.

Any Association member who is interested in subscribing to the service may obtain the necessary details by requesting an order blank from the Doty Technical Laboratories, 1435 Clay Street, North Kansas City, Mo.

LESTER H. FISCHER, *Chairman*

Oxidizing and Bleaching Agents

The committee's efforts have been directed toward the revision of *Cereal Laboratory Methods*. The committee is responsible for Sections 12.0, 13.0, 14.0, 56.0, and 59.0 and portions of Sections 15.0 and 69.0 as they now appear in the 6th edition. All methods involved have been reviewed and several outmoded procedures are being deleted and referenced in the 7th edition. One new method (calcium peroxide) is under study on a collaborative sample basis and is expected to be ready for submission for First Approval in Chicago in May.

The committee work is progressing on a schedule which will meet the May 1960 deadline for submission of new and old methods for approval (First or Final, respectively).

MEADE C. HARRIS, *Chairman*

Physical Testing Methods

The timing of the published reports last year when many decisions were pending for the Washington meeting necessitates an overlap of chronological reporting. The committee has been very active during the last expanded "year" in several areas. The following is a recap of progress and in some cases a projection to the forthcoming meetings.

Farinograph Standardization. As a result of judging farinograph curve characteristics by the committee on selected flours as produced by several mixers supplied by the manufacturers, agreement was reached by the committee members as to the desirable curve characteristics. In order not to judge from a few opinions, the committee submitted the curves to approximately 25 farinograph users. Their evaluation of the curve shapes to represent flour concepts confirmed the committee's opinion.

At the 1959 meeting agreement was reached as to the desirable curve characteristics. A great deal of work followed this to establish the concept of the curve characteristics desired by the committee in preparation for the next step.

Since the curve characteristics are the criteria of judgment, a checking service or certification program and agent must be established. A program was outlined and agreed upon by the committee at the Minneapolis meeting, October 2, 1959. Contact has been made with three independent testing agencies. At the writing of this report two of the three firms have submitted bids and the third is expected, since they have indicated a reason for the delay. The committee will choose the certification agency during or shortly after the May meeting. It is expected that the service of mixer curve characteristic certification can be initiated soon afterwards.

Methods. The Farinograph Standardization Committee was charged with the responsibility of writing methods for the 7th edition of *Cereal Laboratory Methods* to cover the use of the mixograph, the extensigraph, and the amylograph, in addition to adding and revising farinograph tests. Thus the committee name was changed to the Physical Testing Methods Committee. Dale Mecham has been assembling the changes for farinograph methods on the basis of comments received from members at large. He has also assembled a method for the mixograph. William Shuey and I. Hlynka have assembled methods for extensigraph tests. Lawrence Locken has prepared a method for amylograph testing. These will be reviewed at the May meeting and submitted to the Technical Policy Committee.

Farinograph School. The committee members, led by William Shuey and Lawrence Locken, have developed a short course or school with the course material centered around the farinograph and its application. Publicity announcements appear in this issue and have appeared before. The class will be held at the American Institute of Baking starting Thursday afternoon of convention week and continuing through part of Friday. Early registration has been good and a large total registration is expected.

STEPHEN J. LOSKA, *Chairman*

Vitamin and Mineral Analysis

One major activity of the committee was a collaborative test of its newly developed procedure for riboflavin in enriched cereal products. From results of the collaborative analyses, the method appears promising. The other committee activity was to review the analytical methods for vitamins and minerals in the 6th edition of *Cereal Laboratory Methods*.

The committee recommends to the Association that the following procedures in the 6th edition of *Cereal Laboratory Methods* be included in the 7th edition:

First Approval, procedures 5.1, 7.1, 7.2, 9.2a, 9.2i, 15.4, 17.2a, 42.1, 62.1, 91.1.

Final Approval, procedures 6.1, 7.3, 9.2b, 9.2c, 9.2e, 9.2f, 9.2g, 15.1, 17.1a, 17.1b, 17.2b, 42.2, 62.2, 91.2.

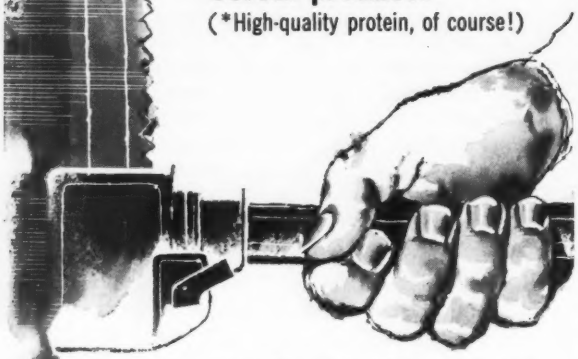
The committee recommends that procedures 9.2d and 9.2h be omitted from the 7th edition of *Cereal Laboratory Methods*.

WELKER G. BECHTEL, *Chairman*

TO JACK UP SALES in today's market add the POWER OF PROTEIN*

to your cereal products

(*High-quality protein, of course!)



Today's smart food buyer insists on not just more protein — but more *high-quality* protein in the cereal she buys.

That's why increasing numbers of cereal manufacturers are turning to Sheftenes! . . . Because Sheftenes are a complete *milk* protein with an essential amino-acid "profile" (especially rich in lysine and tryptophane) that's ideal for upgrading the nutritional value of cereals.

Sheftenes are tasteless, odorless, colorless, fat-free too — and handle readily on your present equipment. And they're exceptionally versatile! With Sheftenes you can achieve the taste and texture characteristics you set out to get . . . and do it economically in the bargain.

If you're looking to "beef up" sales of a new or established brand, add the power of Sheftene high-quality proteins now. For free samples, data or technical assistance write Dept. C-40.

SHEFFIELD CHEMICAL
Norwich, N.Y.

A DIVISION OF NATIONAL DAIRY PRODUCTS CORPORATION

Western U.S. distribution through
BRAUN-KNECHT-HEIMANN CO.
and Affiliates — San Francisco

AACC LOCAL SECTIONS

Northern California Section gathered on February 17, dining at Kirby's Restaurant in El Cerrito and then touring the Western Utilization Research and Development laboratories in Albany, Calif.

• • • •

Northern and Southern California Sections will hold their annual joint meeting, April 8 and 9, at the Town and Country Motel in Fresno. The program starts with a tour of the new Ranchers Cotton Oil plant on Friday afternoon. A cocktail party and banquet will follow. The Saturday session will be devoted to the technical program, highlighted by a talk by National President D. B. Pratt, Jr.

• • • •

Canadian Prairie Section members met on February 16th in the Grain Exchange Board Room, Grain Research Laboratory, Winnipeg. V. Martens of the Laboratory discussed "Some aspects of grain-drying problems in Canada."

A 9-page mimeographed "Review of Activities" of the Section for 1958-59 bespeaks an alert and active group of officers and members. All members, with affiliation, are listed and national membership indicated. A list of officers and their reports follows, and an appendix gives summaries of addresses at various Section meetings throughout the time covered by the review.

• • • •

Chesapeake Section, meeting in Baltimore on Nov. 19 last, heard Leo Friedman speak on the search for unknown toxic factors in chicken feed; microscopic amounts of the wrong chemicals, he said, can be fatal for chickens.

At the January meeting (28th), held in Beltsville, Lawrence Zeleny spoke of his experiences and observations in Europe and in some Asian countries. He described the semi-hard type of clean white wheat preferred in India for their staple food, chapatti, and their methods of marketing wheat. Dr. Zeleny expressed his opinion that in world-competitive markets the U.S. must pay particular attention to tailoring its wheat to the real needs of importing countries.

National President D. B. Pratt, Jr., was present at the Section's February meeting (18th). He brought news of the Association at large, and gave his views on how quality control people should promote, with management, the importance of their work.

The Section will hold a meeting in Philadelphia on April 28 or 29, depending on members' preference. The trip will be made by chartered bus, repeating an occasion of last year.

New members: Edward Seeborg, S. W. Arenson, W. H. Wood, and Ernestine Waugh.

• • • •

Midwest Section, meeting on March 7 in Chicago, heard Section member Roy C. A. Bradshaw of the Quaker Oats Co. speak on "Some properties of batter proteins." He described research he has carried out recently in the Quaker laboratories, seeking an explanation of the relative efficiencies of proteins of wheat, corn, milk, and eggs in pancake batters. This follows up work previously reported at the 1959 AACC annual meeting.

table setting by
Georg Jensen Inc., New York

Basic Good Taste!

For best quality flavor designed especially for your *packaged cereals* and *dry mixes*

Sealva Flavors

Polvaromas

The original hermetically sealed dry powdered flavors designed to withstand shelf-life and bake-out and still deliver fresh full quality flavor at the table.
The IFF laboratories will design a flavor for your exclusive use — tell us your needs.

SEE US AT THE I F T MEETING IN SAN FRANCISCO BOOTHS 15-16

iff

VAN AMERINGEN-HAEBLER • POLAK & SCHWARZ

INTERNATIONAL FLAVORS & FRAGRANCES INC.

417 Rosehill Place, Elizabeth 2, N. J.

Leading Creators and Manufacturers in the World of Flavor

ARGENTINA AUSTRIA BELGIUM BRAZIL CANADA ENGLAND FRANCE GERMANY HOLLAND INDONESIA ITALY NORWAY SOUTH AFRICA SWEDEN SWITZERLAND

New York Section, meeting on February 16, had as speaker Bernard L. Oser, president and director of Food and Drug Research Laboratories, on the subject "Food Additives legislation – interpretations." First outlining the background of food legislation in general, Dr. Oser elaborated on the present additives law; he described procedures for obtaining FDA approval of food additives, and stressed the need for exchange of information between industries so as to avoid duplication of effort in obtaining approval. Specific applications were discussed in a question-and-answer period.

• • • •

Niagara Frontier Section met on February 15 at the University of Buffalo, with 35 members and guests in attendance to greet and listen to National President D. B. Pratt, Jr. Mr. Pratt related news of Association affairs and gave his views on how quality control people can and should make their own worth better understood by management.

In keeping with their policy of several years' standing, the Will Corporation of Buffalo again presented an engraved gavel to incoming chairman Robert Van Burek.

New members: Paul Buck, Cornell University; Dennis Brown and Carl Smith, Pillsbury Mills; Alvin Anderson, Richard Jockum, and Walter Bryant of Standard Milling Co.

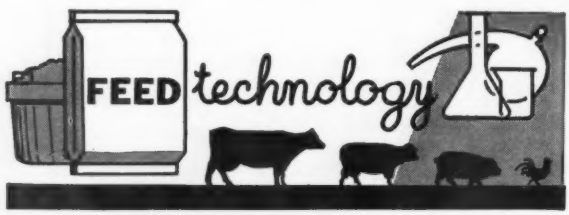
• • • •

Toronto Section met on February 12 at the Carleton Club, welcoming National President D. B. Pratt, Jr., as guest and speaker. Mr. Pratt, urging better communications, gave everyone something to be concerned about – a real pep talk for both management and quality control.

• • • •

Pacific Northwest Section reports on a January 12 meeting of the Western Wheat Quality Laboratory's advisory board. W. F. Sollars discussed some aspects of bleaching wheat flours. Doyle Udy reported on some differences in crude and refined wheat glutens and the effect of bromate on these glutens. Mark Barmore reviewed the work done during the past year, and outlined current and proposed future work of the Laboratory.

Mark Barmore represented the Section at the annual meeting, Jan. 26 and 27, of Washington State University's Agronomy Board.



NEWS AND ANNOUNCEMENTS

1960 Annual Meeting. Once again, our Association has scheduled a symposium on feed technology for the annual meeting in Chicago in May. J. F. Mahoney, symposium chairman, reports that seven papers are scheduled to date. These cover such pertinent subjects as starch solubility in grains, vitamin A determinations, feed microscopy, statistical quality control, protein analysis, amino acids, and antioxidants. Every feed chemist, nutritionist, and researcher will obtain useful information from the highly qualified speakers who are participating. Be sure to come ready to ask questions on these subjects.

Vitamin E. An excellent review on vitamin E was presented by Martha Dicks of the University of Connecticut at the last Animal Nutrition Research Council annual meeting in Washington, D.C. This included structure, synthesis, chemical analysis, and bioassay of tocopherol. The paper was published recently in the February 13 issue of *Feedstuffs*, together with a bibliography of 91 references. You will want a copy of this in your file.

New Merck Index. The publications department of Merck & Co., Inc., has announced March publication of the new 7th edition of the *Merck Index*. Price, $12.00.

Vitamin Stability. Of interest to all feed chemists and nutritionists will be a paper by R. D. Creek *et al.* of Purdue, which was just published in *Poultry Science*, January, 1960, p. 109-111. This reports data on the effect of manganese sulfate on vitamin stability in poultry mash. The results showed no effect directly attributable to manganese. However, the authors commented on the inherent instability of carotene, thiamine and pantothenic acid, particularly during summer storage. They recommended that feed be used up as rapidly as possible. It is unfortunate that no data were obtained on pellets or crumbles since most poultry feed is produced in this form today. One can logically assume that even greater losses of carotene, thiamine, and pantothenic acid can be expected in pelleted rations.

1960 Feed Production School. Plan now to attend the 1960 School, September 21–23 in the Continental Hotel, Kansas City, Mo. The committee has lined up a top-notch program around the theme of "Grinding, compounding, and mixing." Separate sessions designed specifically for plant operating personnel and for research personnel are being arranged. Progress reports on continuing research projects are also included, covering pellet mill die design, starch gelatinization, and ingredient flow from bins. Watch this column for further details.

Vitamin A Assay. Feed chemists performing spectrophotometric determinations for vitamin A will be interested in a recent paper on this subject. It appeared in the October 1959 issue of *J. Am. Pharm. Assoc., Sci. Ed.*, p. 611, authored by J. A. Napoli *et al.* A modified USP XV procedure is proposed which shortens assay time and improves precision. Your departmental editor just ran across this report, and hastens to call it to your attention in case you too are slightly behind in your reading of technical literature.

Feed Microscopy. Plans are going ahead for the 8th annual meeting of the American Association of Feed Microscopists at the Hilton Hotel in historic San Antonio, Texas, June 13–15. The popular Microscopy Workshop is being expanded this year to provide more actual working hours over the microscope for enrollees. The workshop and formal program will be of real value to both the beginner and the "old pro" in this fascinating field of quality control. Mark your calendar now.

ROBERT C. WORNICK

EDITOR'S NOTE: *Some reprints are available, from the senior author, of the article by R. C. Wornick, G. O. Kuhn, and W. D. Lewis, entitled:* Effects of Commercial Feed Pelleting Operations on Microingredients *(Cereal Science Today 4:* 296; 1959 — December 1959 issue).

● low sweetness ● soluble, uniform ● free flowing, anti-caking aid
● flavor-enhancing ● pigment-absorbing
● non-reacting with other ingredients ● fermentation agent
● bland, almost tasteless triturate

Lactose is an amazing sugar with unlimited uses. It can improve your present products and help you develop new ones. It can lower your costs, simplify your processing. New uses are being discovered for it every day.

Only Western can supply you with all forms of Lactose—five grades, ten granulations. Strict chemical and bacteriological specifications and a rigid quality control program assure highest quality.

Take a fresh look at the characteristics of Lactose. One of the grades or granulations may help solve a problem you are working on right now. For free samples and information, write our Technical Service, Department 50D. (Tell us the applications you are considering.)

Foremost Lactose

WESTERN CONDENSING COMPANY

Appleton, Wisconsin

World's Largest Producer of Lactose-Pure Milk Sugar

Distributed Nationally by Chemical Department, McKESSON & ROBBINS, INC.

COME TO THE

AACC

CONVENTION

IN CHICAGO, ILL.

NOT ONLY TO

FIND OUT

WHO IS

Jim Doty

BUT ALSO TO

LISTEN TO

THE EXCELLENT

PROGRAM

PREPARED FOR YOU

★ ★ ★

May 1 thru 5, 1960

MORRISON HOTEL

People, Products, Patter

• • • People

Rae H. Harris, 67, head of the Department of Cereal Technology, North Dakota Agricultural Experiment Station, Fargo, died on February 25, 1960 as the result of a heart attack. Dr. Harris took his Ph.D. at the University of Minnesota and was a long-time member of the AACC, having joined in 1923.

Frank Szpak named project leader in Jell-O research group at General Foods Research Center; has been with the Center since 1954, most recently working on flavor research.

Ray Thelen, technical director of Pillsbury's bakery mix division, has been given additional assignment on sales, to permit maximum utilization of his 27 years of experience in bakery production.

Doyle C. Udy resigns from his position with the Western Wheat Quality Lab. to devote full time to his new business enterprise, the Udy Analyzer Co., involving protein analysis in cereals and major feed ingredients. Dr. Udy has developed a rapid method for running proteins.

Robert S. Yare named section head in chemical research area, General Foods Research Center, from director of biochemistry lab, Red Star Yeast & Products Co.; also has been associated with the Quartermaster Food & Container Institute, Chicago.

• • • Products

New B&L optical instrument. A new Bausch & Lomb hydrogen arc illuminator has been designed for use with the B&L grating monochromator, but can be easily adapted to custom-made spectrophotometers. It is designed to eliminate water supply and drainage problems, and is expected to have widespread application in such special studies as fluorescence and ultraviolet reflectance. Research laboratories should find it an improved UV light source for analyzing the optical properties of materials. Further details available from Analytical Instruments Dept., Bausch & Lomb Optical Co., Rochester, N.Y.

• • •

Plastic laboratory ware. A new catalog of polyethylene laboratory ware is offered by Harshaw Scientific (division of Harshaw Chemical Co.). The booklet contains a comprehensive, illustrated listing of this ware which is in constantly increasing demand by the nation's laboratories: items fabricated from regular and high-temperature polyethylene, polypropylene, polyvinyl chloride, polystyrene, tetrafluoroethylene, and other materials. Write to Harshaw Scientific, 1945 E. 97th St., Cleveland 6, Ohio.

• • • Patter

The aerosol sixties. An interesting item in **D&O News** (Dodge & Olcott, Inc.) for February 1960 suggests for the sixties, already well started off with ambitious name tags like "soaring" – the aerosol sixties, in honor of the pushbutton phenomenon that has really come into its own.

• • •

New quarters. The Los Angeles office of Givaudan-Delawanna, Inc., and its associate companies, Givaudan Flavors, Inc., and Sindar Corporation, has moved to new and modern quarters at 6022 West Pico Blvd., Los Angeles 35, Calif.

CLASSIFIED

WANTED: NUMBER TWO MAN FOR modern, well-equipped flour mill laboratory. B. S. degree minimum, preferably in cereal chemistry. Mill laboratory experience desirable. This is a challenging and rewarding position for the right man. The Mennel Milling Company, P. O. Box 189, Fostoria, Ohio.